DS6500

Reference Manual

DATALOGIC

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DATALOGIC S.p.A.
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DS6500 Reference Manual

Ed.: 07/2006

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REFERENCES

REFERENCE DOCUMENTATION

The documentation related to the DS6500 management is listed below:

- C-BOX100 Installation Manual
- INT-30 20 mA Current Loop Interface Board for C-BOX 100
- PWR-120 power supply unit
- GFC-60 90° deflecting mirror
- GFC-600 90° deg. mirror close distance
- Document about the Ethernet connectivity
- Document about the Profibus connectivity
- Help On-Line in PDF format

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COMPLIANCE

ELECTRICAL SAFETY

This product conforms to the applicable requirements contained in the European Standard for electrical safety EN-60950-1 at the date of manufacture.

LASER SAFETY

The following information is provided to comply with the rules imposed by international authorities and refers to the correct use of the DS6500 reader.

Standard Regulations

This scanner utilizes a low-power laser diode. Although staring directly at the laser beam momentarily causes no known biological damage, avoid staring at the beam as one would with any very strong light source, such as the sun.

Avoid that the laser beam hits the eye of an observer, even through reflective surfaces such as mirrors, etc.

This product conforms to the applicable requirements of both EN60825-1 and CDRH 21 CFR1040 at the date of manufacture. The reader is classified as a Class 2 laser product according to EN60825-1 regulations and as a Class II laser product according to CDRH regulations.

Disconnect the power supply when opening the device during maintenance or installation to avoid exposure to hazardous laser light.

There is a safety device which allows the laser to be switched on only if the motor is rotating above the threshold for its correct scanning speed.

WARNING

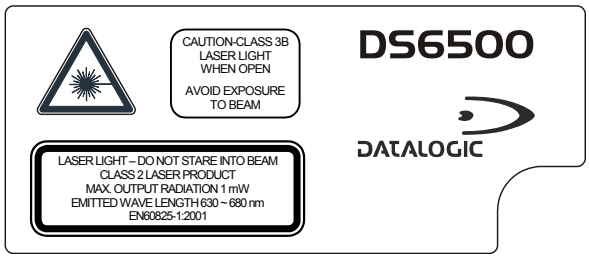
Use of controls or adjustments or performance of procedures other than those specified herein may result in exposure to hazardous visible laser light.

The laser light is visible to the human eye and is emitted from the window on the head of the reader (Figure A, 7).

Warning labels indicating exposure to laser light and the device classification are applied onto the head of the reader (Figure A, 1, 3):

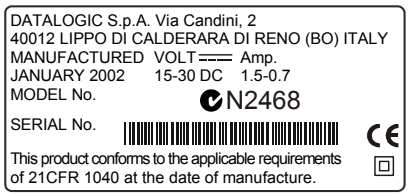
AVOID EXPOSURE
LASER RADIATION IS EMITTED FROM THIS APERTURE
AVOID EXPOSURE – LASER LIGHT
IS EMITTED FROM THIS APERTURE

Laser Safety Label for Oscillating Mirror and Standard Models



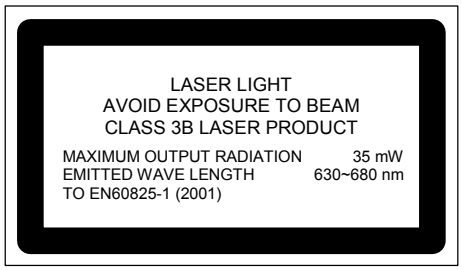
Warning and Device Class Label

The identification label is applied onto the bottom part of the scanner (Figure A, 2):


DATALOGIC S.p.A. Via Candini, 2
40012 LIPPO DI CALDERARA DI RENO (BO) ITALY
MANUFACTURED VOLT ⎓ Amp.
JANUARY 2002 15-30 DC 1.5-0.7
MODEL No.
N2468
SERIAL No.
This product conforms to the applicable requirements
of 21CFR 1040 at the date of manufacture.

Device Identification Label

The laser diode used in this device is classified as a Class 3B laser product according to EN60825-1 regulations and as a Class IIIb laser product according to CDRH regulations. As it is not possible to apply a classification label on the laser diode used in this device, the following label is reproduced here:



Laser Diode Class Label

Any violation of the optic parts in particular can cause radiation up to the maximum level of the laser diode (35 mW at 630~680 nm).

POWER SUPPLY

- **This product is intended to be installed by Qualified Personnel only.**

- **All DS6500 Models:**

  This device is intended to be supplied by a UL Listed Power Unit marked “Class 2” or LPS power source which supplies power directly to the scanner via the 25/26-pin connector.

WEEE COMPLIANCE

GENERAL VIEW

DS6500

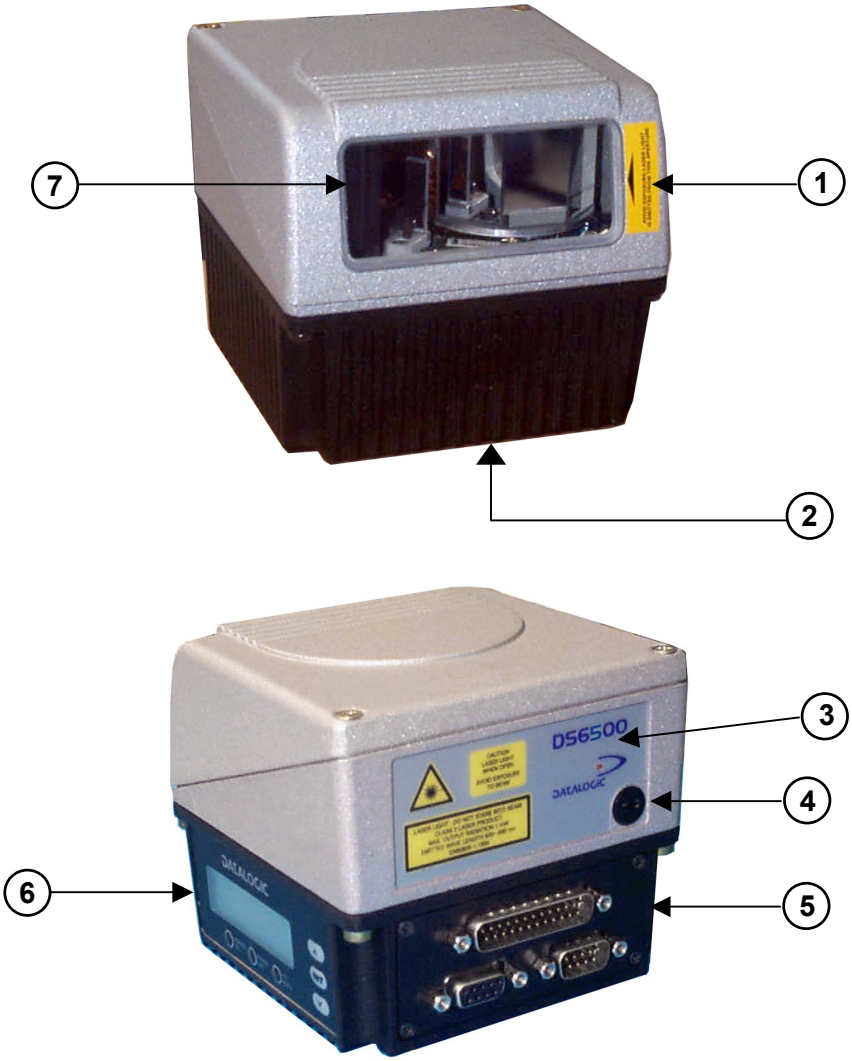


Figure A - DS6500

1. Laser Safety Label
2. Identification Label
3. Warning and Device Class Label
4. Service Cap
5. Connector Panel
6. Display and Keypad Panel
7. Laser Beam Output Window

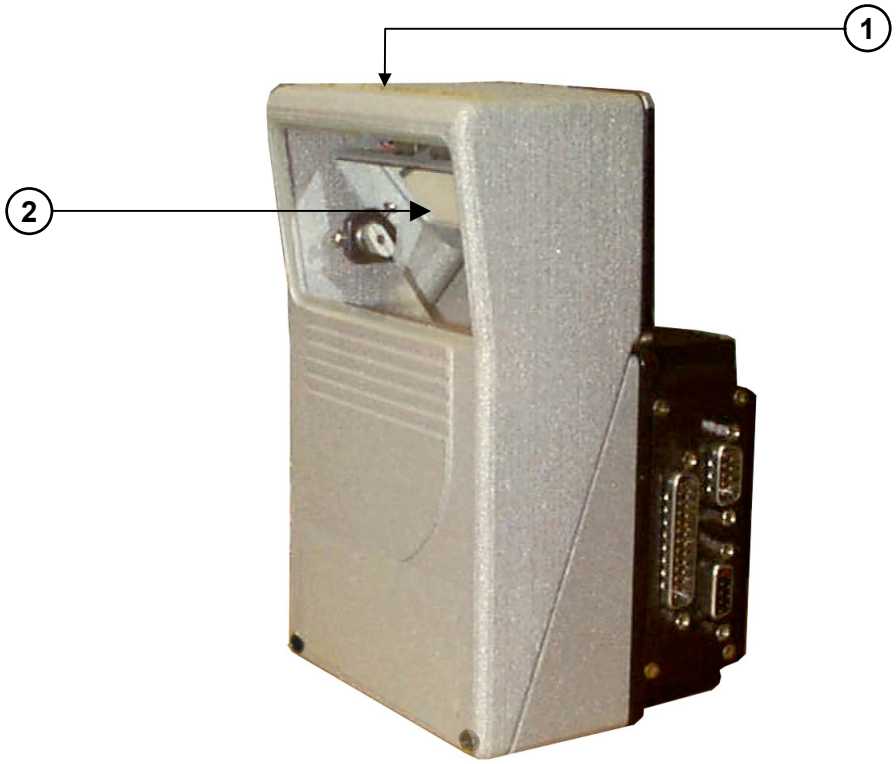


Figure B - DS6500 Oscillating Mirror Version

1 Laser Safety Label

2 Laser Beam Output Window

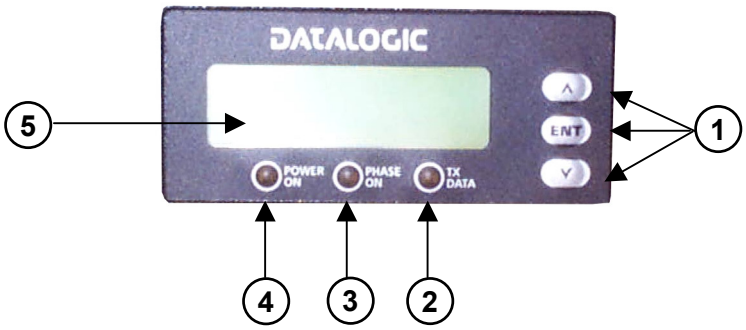


Figure C - Display and Keypad Panel

1 Programming Keypad

2 TX Data LED

3 Phase On LED

4 Power On LED

5 LCD Display

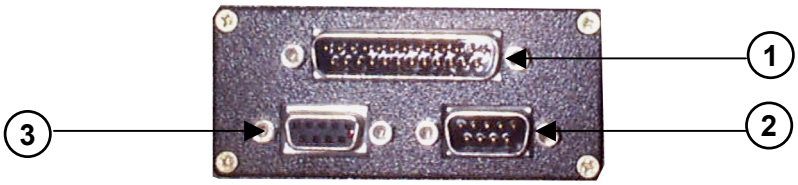


Figure D - Connector Panel for Master/Slave Models

1. Main/Aux. Interface 25-pin D-Sub male connector
2. Lonworks 9-pin male connector
3. Lonworks 9-pin female connector

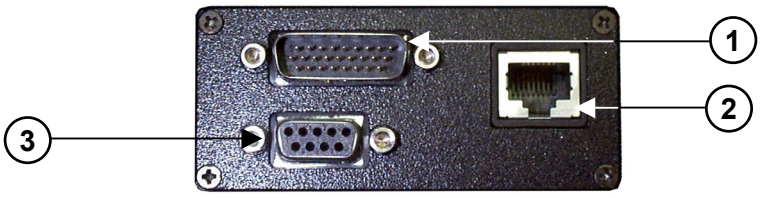


Figure E – Connector Panel for Ethernet Models

1. Main/Aux. Interface 26-pin D-Sub male connector
2. RJ45 modular connector for Ethernet Interface
3. Lonworks 9-pin female connector

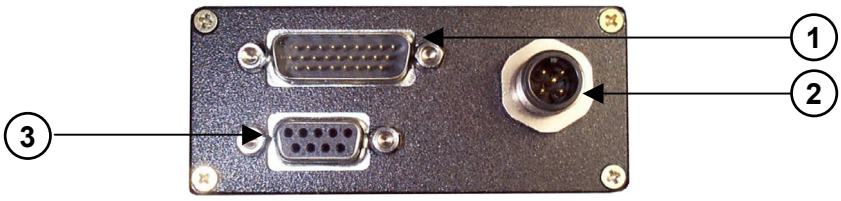


Figure F – Connector Panel for DeviceNet Models

1. Main/Aux. Interface 26-pin D-Sub male connector
2. DeviceNet 5-pin male connector
3. Lonworks 9-pin female connector

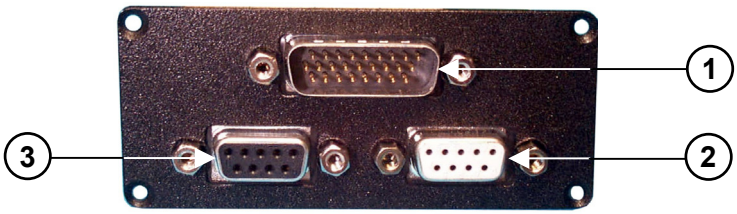


Figure G – Connector Panel for Profibus Models

1. Main/Aux. Interface 26-pin D-Sub male connector
2. Profibus 9-pin female connector (white)
3. Lonworks 9-pin female connector

GUIDE TO INSTALLATION

POINT-TO-POINT INSTALLATION

The following can be used as a checklist to verify all the steps necessary to complete installation of the DS6500 scanner.

1) Read all information in the section “Safety Precautions” at the beginning of this manual.

2) Correctly mount the scanner using the bracket provided according to the information in par. 2.2.2 and position the reader at the correct reading distance according to your model as shown in par. 2.5 and par. 4.4.

3) Make electrical connections to your DS6500 scanner by:

   a) Connecting the DS6500 scanner to the C-BOX 100 by means of one of the cables provided as accessory (see par. 1.5).

   b) Providing correct and complete system cabling through the C-BOX 100 according to the signals (trigger, inputs, outputs) necessary for the layout of your application.
      - Layout: Point-to-Point, Pass Through, RS232 Master/Slave, Lonworks, Fieldbus.. See sub-paragraphs under 2.7 for reference.
      - Cabling: Power, Main Serial Interface – RS232, RS485 Half Duplex, RS485 Full Duplex, 20 mA Current Loop, Auxiliary Interface, Inputs, Outputs, etc -. For further details, see all sub-paragraphs under par. 2.3.

4) Configure the DS6500 scanner by installing and running the Genius™ configuration program from the CD-ROM provided. The main steps are:
   - Select the codes to be read
   - Set-up the communication parameters
   - When PackTrack™ is required, set the PS Offset and Position parameters
   - Define data formatting parameters

NOTE

Fine tuning of the scanner position for barcode reading can be accomplished by performing a test through the SPY configuration tool in Genius™.

5) Exit the configuration program and run your application.

The installation is now complete.

MASTER/SLAVE LONWORKS INSTALLATION

The following can be used as a checklist to verify all the steps necessary to complete installation of the DS6500 scanner in a Master/Slave Lonworks network.

1) Read all information in the section “Safety Precautions” at the beginning of this manual.

2) Correctly mount the scanner using the bracket provided according to the information in par. 2.2.2 and position the reader at the correct reading distance according to your model as shown in par. 2.5 and par. 4.4.

3) Make electrical connections to your DS6500 scanner by:
   a) Connecting the DS6500 Master scanner to the C-BOX 100 by means of one of the cables provided as accessory (see par. 1.5).
   b) Correctly inserting the BTK-6000 terminator in the DS6500 Master reader according to the information given under “Local Lonworks Network” in par. 2.3.2 and par. 2.7.5.
   c) Completing the system wiring adding as much slave scanners as required by your system layout (refer to par. 2.7).
   d) Correctly inserting the BTK-6000 terminator in the last DS6500 Slave reader of the network according to the information given under “Local Lonworks Network” in par. 2.3.2 and par. 2.7.5.

4) Install and run the Genius™ configuration program from the CD-ROM provided. Configure the Local Lonworks Network using one of the procedures given below:
   a) Configure the entire network through the Master as described in par. 3.2.2.
   b) Configure the Master as described in par. and locally define each slave scanner address as described in par. 3.2.2.
   c) Define each scanner, master and slaves (with their addresses), by using the scanner keypad according to the information given in par. 2.8.1.

5) Configure the Master scanner through the Genius™ program. The main steps are:
   - Select the codes to be read
   - Set-up the communication parameters
   - When PackTrack™ is required, perform PackTrack™ calibration, see par. 4.3.1
   - Define data formatting parameters

6) Configure each Slave scanner through the Master scanner using Genius™. The main steps are:
   - Select the codes to be read
   - When PackTrack™ is required, perform PackTrack™ calibration, see par. 4.3.1

NOTE

Fine tuning of the scanner position for barcode reading can be accomplished by performing a test through the SPY configuration tool in Genius™.

7) Send the configuration to the Master.

8) Optionally, perform the ASR Network Configuration procedure for system backup purposes (see par. 5.2.1).

9) Exit the configuration program and run your application.

The installation is now complete.

1 INTRODUCTION

1.1 PRODUCT DESCRIPTION

The DS6500 is a high performance laser scanner in a complete range of industrial bar code readers offering an innovative and modular solution in terms of reading performance, connectivity and maintenance, in addition to a completely new hardware and software platform.

The DS6500 has been specifically designed for simple installation, easy use and flexibility. An innovative mechanical design together with the Datalogic patent pending Step-a-Head™ feature make it possible to rotate the reader head and the decoder base independently from each other. Step-a-Head™ enables the DS6500 to always be installed in the ideal position, by modifying the orientation of the connector panel while leaving the laser window in the desired position. The need for space is minimized and installation is easier.

The DS6500 is based on the ASTRA™ technology which allows to switch electronically the two laser diodes depending on the distance from the barcode. The real time depth of field (DOF) provided by the DS6500 covers a wide set of applications, from the stand alone one to the multisided tunnels conveyors.

The DS6500 can read all most popular bar codes even in the most difficult conditions, thanks to a new generation decoder with Intel XScale CPU and code reconstruction technology (ACR™ 4).

This reader is also offered in a model with an integrated SW programmable oscillating mirror.

Great attention has been given to built-in connectivity for all market standards. Lonworks, Profibus, DeviceNet and Ethernet bus have been integrated in dedicated versions of the decoder base.

Some of the main features of DS6500 are listed below:

- scanning speed up to 1200 scans/sec;
- 2 serial communication interfaces
- reading all popular codes;
- supply voltage from 15 to 30 Vdc;
- electrical connection through connectors;
- high speed Lonworks connectivity for Master/Slave layout;
- built-in connectivity for Profibus, DeviceNet and Ethernet;
- programmable in 5 different operating modes to suit the most various barcode reading system requirements;
- light source: solid state laser diode; the light emitted has a wavelength between 630~680nm.
- IP64 protection class of the enclosure (not yet available for Ethernet models).

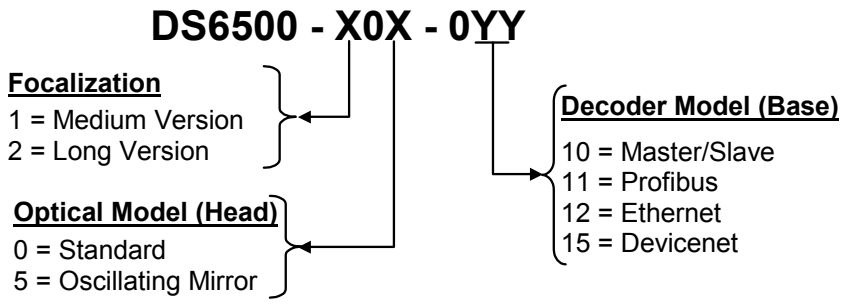
Manufacturing is the traditional industry for Auto-ID applications, with a market becoming mature, standardized reading solutions and a tough competition. Manufacturing has been the target industry since the very beginning of the new 6000 family with the DS6300. The DS6500 makes possible to enlarge the market applications including Transportation & Logistics industry, making wider the Business Opportunities scenario.

Feature	Benefit
Modular solution with separated head and base and Step-A-Head™ feature	• Possibility to select the combination of head and base that best fits the needs of the application; • Great scalability of the offer; • Down time cost reduction, since the decoder base works even if the head has been removed; • Easy maintenance. In case of replacement of the head, all the configuration parameters are stored in the base, and the scanner is automatically configured; • Easy installation with the minimum room needed.
Reading parcels on conveyors	• As a result of the ASTRA™ double laser technology, DS6500 gives a great real time DOF even on high speed conveyors. Furthermore, DS6500 implements the Packtrack™ functionality which leads to an increase of the plant production as a result of the augmented system throughput.
Master working as a multiplexer on a high speed Lonworks bus	• Great competitiveness of the offer, since the cost of an external multiplexer is saved; • High data transfer on a industrial, reliable bus running at 1,2 Mbit/sec.
GENIUS™ Configurator SW	• Reduced learning time, with an easy wizard approach; • Multilanguage platform; • All the configuration parameters stored into the scanner; • Not dependent on the Physical interface.

1.2 MODEL DESCRIPTION

The DS6500 scanner is available in versions that differ in regard to the following characteristics:

- Optical Model (Head)
- Decoder Model (Base)
- Focalization



1.3 OSCILLATING MIRROR MODELS

Oscillating mirror models are used when coverage of a large reading area is required, mainly in picket fence applications.
The DS6500 scanner mounts a dedicated optic head with integrated oscillating mirror driven by a linear motor. The speed, the precision, the repeatability, and the reliability of this driving technology assure high level performance.

The new oscillating mirror is completely software controlled and software programmable. The Genius™ software tool allows adjusting the linear motor speed (oscillating frequency) and the upper and lower limits of the oscillation by defining the top and bottom line limit angles.

When the oscillating mirror is programmed to read barcode labels at very small angles, position the reader to **assure at least 10°** for the Skew angle (see par. 2.4). This angle refers to the most inclined or external laser line, so that all other laser lines assure more than 10° Skew. This avoids the direct reflection of the laser light emitted by the reader.

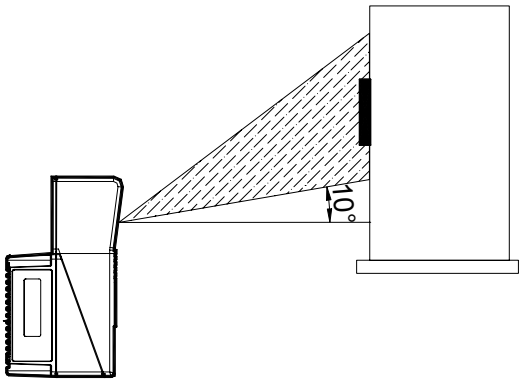


Figure 1 – Oscillating Mirror Skew Angle

Otherwise, the scanner can be mounted at an angle of inclination of 17.5° in order to attain symmetrical deflection ranges.

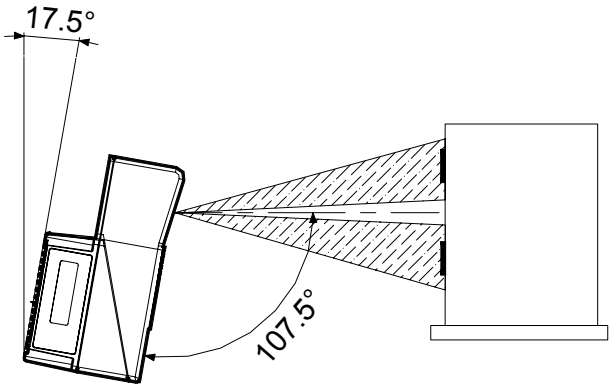


Figure 2 - Oscillating Mirror Reading Position

In the above case, the zone where the scan line is perpendicular to the reflecting surface corresponds to a neutral zone at the center of the reading field.

The mirror can be deflected up to 40°. Oscillation with respect to the output window median axis is asymmetrical (see figure below).

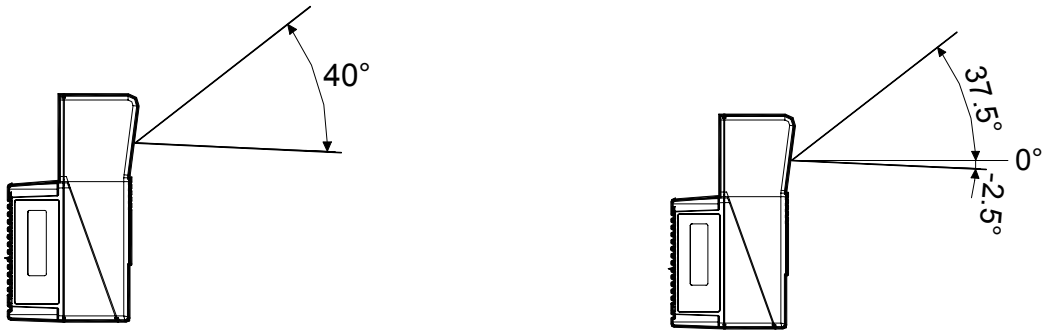


Figure 3 - Oscillating Mirror Maximum Aperture and Asymmetry

By configuring the oscillating speed up to the maximum value of 19 Hz, raster emulation can be performed for reading fast moving objects.

Hz	Max. Aperture
0-5	40°
6-10	30°
11-15	20°
16-19	10°

NOTE

By limiting the raster width to the minimum necessary, the number of scans on the reading surface is increased.

Oscillating angles are selected in software where the minimum and maximum angles correspond to –2.5° and +37.5°.

The scanner can be tilted in order for the 17.5° software setting to correspond with the 0° horizontal plane.

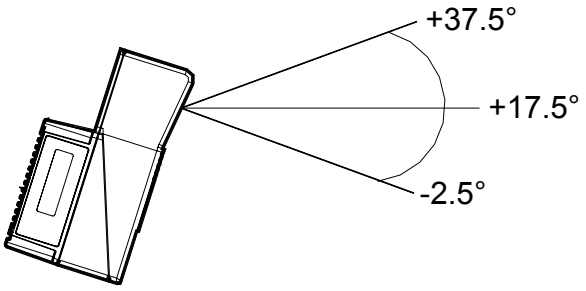


Figure 4 - Oscillating Mirror Extreme Angle Positions

These models provide higher scanning speed (1200 scans/sec) compared to standard models and the reading performance is not adversely effected by the oscillating mirror.

The following example represents the selection of an angle of +10° for the bottom line and an angle of +20° for the top line (see figure below).

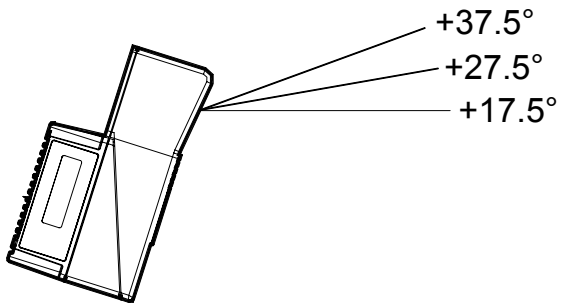


Figure 5 - Oscillating Mode

Refer to par. 2.2.1 for details about oscillating mirror mounting.

1.4 INDICATORS

The DS6500 decoder base provides an LCD display for system messages and configuration menus. The three keys present on the side of the display allow configuration menu navigation (Figure C, 1).
The three LED indicators have the following functions:

POWER ON	(red)	Indicates the reader is turned on (Figure C, 4)
PHASE ON	(yellow)	Indicates the presence sensor is turned on (Figure C, 3).
TX DATA	(green)	Indicates the main serial interface is operating correctly during data transmission (Figure C, 2).

1.5 ACCESSORIES

The following accessories are available on request for DS6500:

Name	Description	Part Number
CAB-6001	cable to C-BOX100 1 m	93A051190
CAB-6002	cable to C-BOX100 2 m	93A051200
CAB-6005	cable to C-BOX100 5 m	93A051210
CAB-6010	cable to C-BOX100 10 m	93A051271
CAB-6011	cable to C-BOX100 1 m (DS6500 Fieldbus version)	93A051221
CAB-6012	cable to C-BOX100 2 m (DS6500 Fieldbus version)	93A051222
CAB-6015	cable to C-BOX100 5 m (DS6500 Fieldbus version)	93A051223
CAB-6101	cable master/slave 1 m	93A051220
CAB-6102	cable master/slave 2 m	93A051230
CAB-6105	cable master/slave 5 m	93A051240
CAB-6112	cable master/slave no power 2 m	93A051224
CAB-6115	cable master/slave no power 5 m	93A051225
CAB-6305	power cable Fam 6k 5 m	93ACC1768
CAB-6310	power cable Fam 6k 10 m	93ACC1752
C-BOX 100	passive connection box	93ACC1510
INT-30	20 m.A. C.L. interface board for C-BOX 100	93A151022
PWR-120	power unit 110/230 V AC 24 V	93ACC1530
BTK-6000	terminator kit (5 pcs)	93ACC1710
PG6002	single unit power supply (US)	93ACC1718
PG6001	single unit power supply (UK)	93ACC1719
PG6000	single unit power supply (EU)	93ACC1720
FBK-6000	fast bracket kit (2 pcs)	93ACC1721
GFC-60	90° mirror	93A201100
GFC-600	90° deg. mirror close distance	93A201102
US-60	mounting bracket kit (5 pcs) for multisided stations	890001020
MEP-542	Photocell kit – PNP	93ACC1727
MEP-543	Photocell kit - NPN	93ACC1728
OEK-2	Optical encoder (10 m cable + spring)	93ACC1770
OEK-1	Optical encoder kit + 10 m cable	93ACC1600

2 INSTALLATION

To install the system follow the given procedure:

- Select the mounting location for DS6500;
- Mount the DS6500 scanner;
- Position the scanner with respect of the barcode;
- Proceed with system electrical connection;
- Install the GENIUS™ program on the PC and configure the scanner;

WARNING

When installing several scanners, take care to position them correctly so that no laser beam enters the reading window perpendicularly and at the same level of the output beam of the other scanners. This condition could occur more frequently for side mounted applications. If these precautions are not followed, it may occur that the laser of the blinded scanner starts blinking due to an internal circuit which temporarily turns the laser off when detecting a power anomaly. To resolve this problem, it is sufficient to slightly change the inclination and position of one of the two scanners involved.

NOTE

Refer to the Reference Documentation for details on connecting your DS6500 reader to other devices in the system (i.e. C-BOX 100, etc.).

2.1 PACKAGE CONTENTS

Verify that the DS6500 reader and all the parts supplied with the equipment are present and intact when opening the packaging; the list of parts includes:

- DS6500 reader
- Installation Quick Reference + barcode test chart
- DS6500 configuration CD-ROM
- Mounting bracket and screws

Figure 6 - DS6500 Package Contents

2.2 MECHANICAL MOUNTING

2.2.1 Mounting the Scanner

The DS6500 reader can be positioned and installed in the best way possible as a result of the Step-a-Head™ feature. Thanks to the separation between Head and Base, you can modify the orientation of the decoder base, and therefore display-keypad and connector panels, while keeping the optic head in the correct reading position. The reading head and the decoder base can be rotated independently from each other allowing the installation even in the most critical locations.

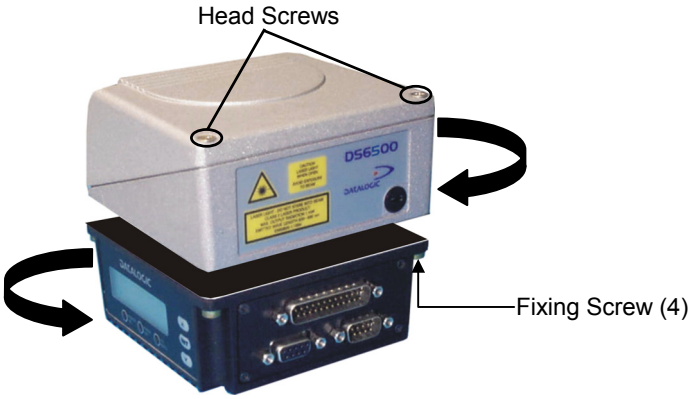


Figure 7 - Step-A-Head™ Feature

To rotate the head follow the given procedure:

1. detach the head from the base by unscrewing the four fixing screws;
2. rotate the head in the desired position;
3. loosen but don't remove the two screws on top of the head;
4. affix the head onto the base carefully aligning the four fixing screws and progressively tightening them about half-way;
5. completely tighten the two screws on top of the head;
6. completely tighten the four fixing screws.

The following diagrams give the overall dimensions of the reader standard model, oscillating mirror model and mounting brackets. They may be used for their installation. Refer to par. 2.4 for correct positioning of the scanner with respect to the code passage zone.

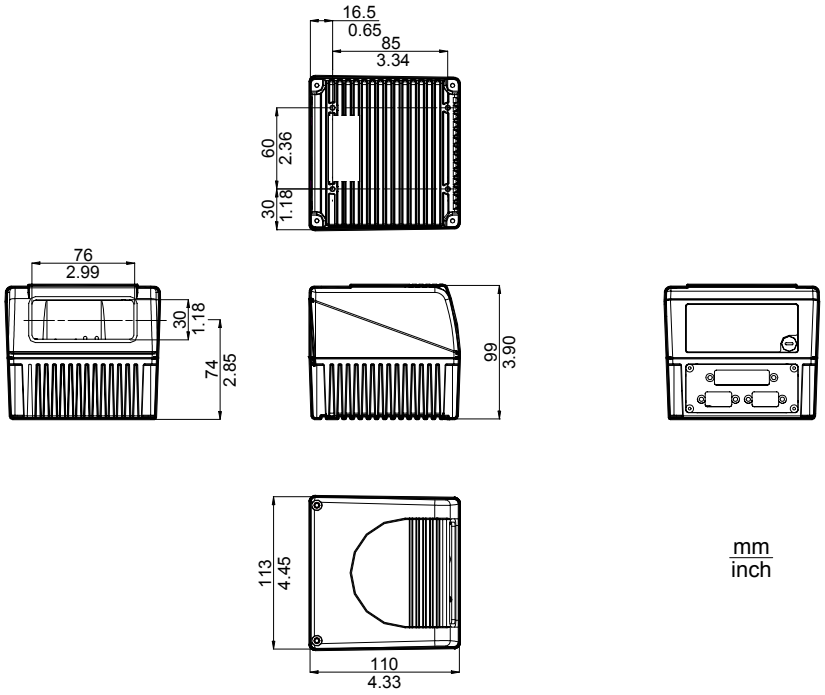


Figure 8 - DS6500 Overall Dimensions

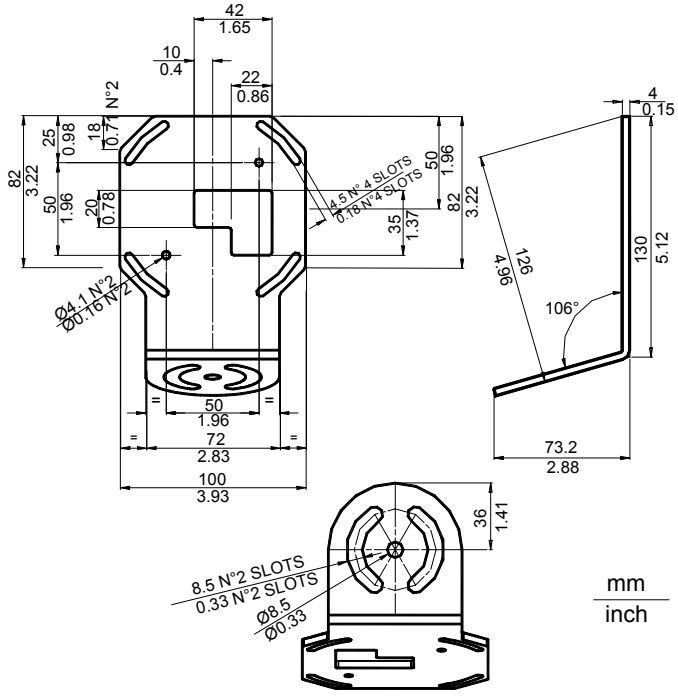


Figure 9 – ST-237 Mounting Bracket Overall Dimensions

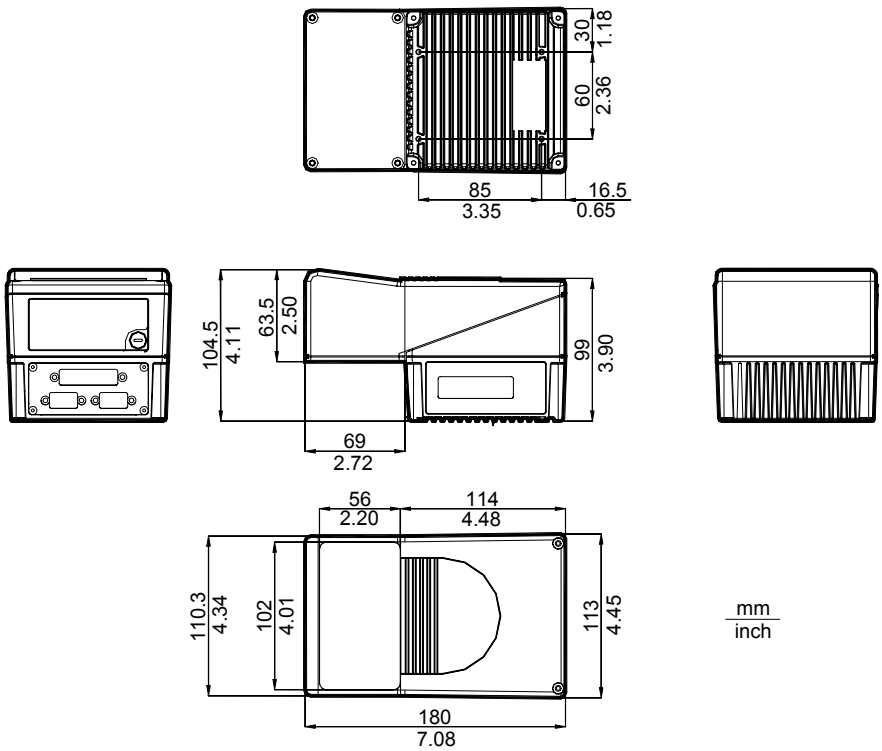
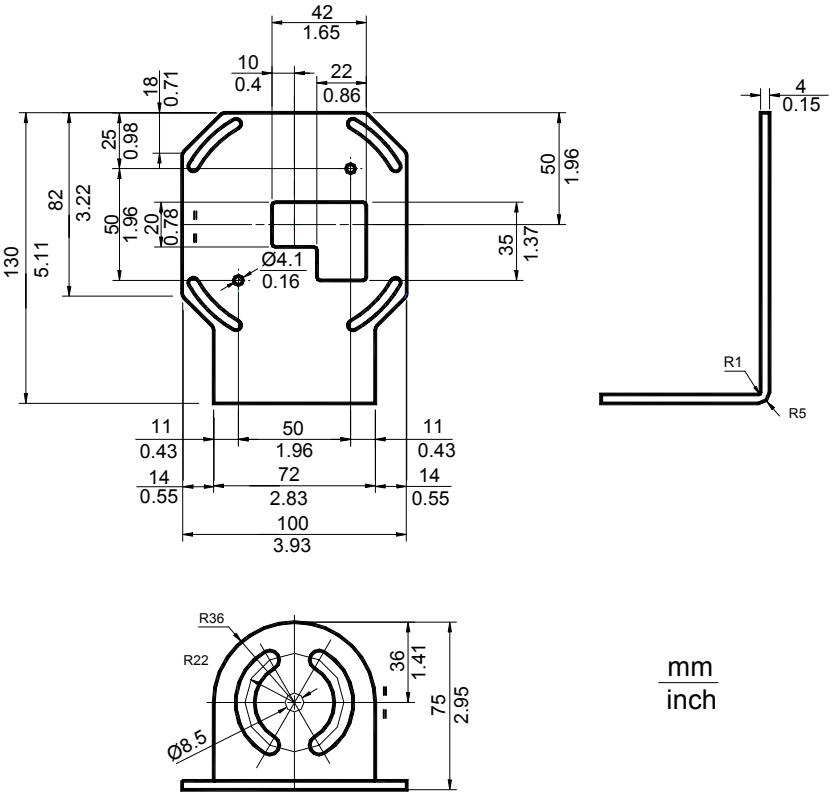


Figure 10 - DS6500 Oscillating Mirror Model Overall Dimensions



mm
inch

Figure 11 – ST-210 Mounting Bracket Overall Dimensions

2.2.2 Mounting the Scanner with Accessories

The following accessories allow installing the DS6500 reader in the most suitable position for your network layout:

- ST-237 mounting bracket;
- ST-210 mounting bracket;
- FBK-6000 fast bracket.

The ST-237 is a 106° mounting bracket to be mounted on the reader as displayed in the image below:

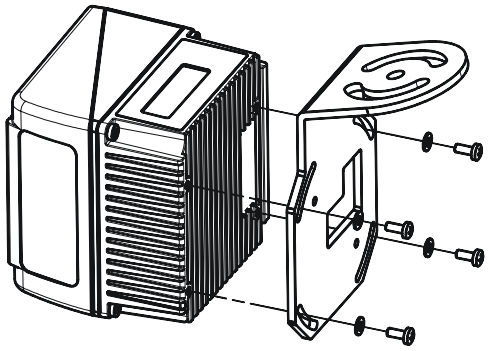


Figure 12 – Mounting the ST-237 Mounting Bracket

The ST-210 is a 90° mounting bracket to be mounted on the reader as displayed in the image below:

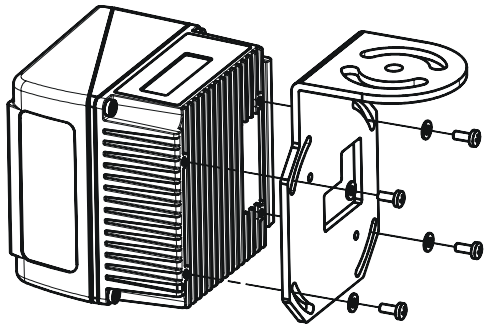


Figure 13 – Mounting the ST-210 Mounting Bracket

The FBK-6000 is a fast bracket kit allowing a quick and easy mounting of the scanner on either the ST-210 or the ST-237 brackets.

First, it is necessary to fix the FBK-6000 to the DS6500 scanner by means of the mounting screws:

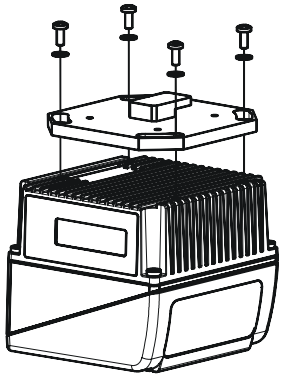


Figure 14 – Mounting the FBK-6000 on the Scanner

Then, attach the assembly to the mounting bracket by slipping the hook into the bracket hole. Finally, fix it by means of the 2 fixing screws:

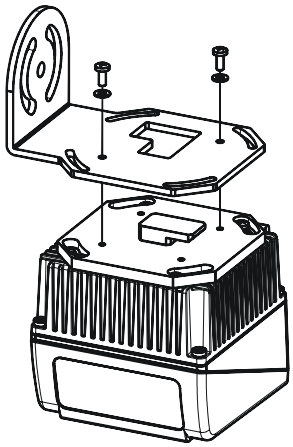


Figure 15 – Mounting the Assembly on the Bracket

2.3 ELECTRICAL CONNECTIONS

All the connectors available for each scanner model are the following:

Scanner Model	Connector
Master/Slave	25-pin male serial interface and I/O connector 9-pin male Lonworks connector* 9-pin female Lonworks connector
Ethernet	26-pin male serial interface and I/O connector 9-pin female Lonworks connector RJ45 modular connector
DeviceNet	26-pin male serial interface and I/O connector 9-pin female Lonworks connector 5-pin male connector
Profibus	26-pin male serial interface and I/O connector 9-pin female Lonworks connector 9-pin female Profibus connector

CAUTION

** Do not connect an RS232 port to the 9-pin Lonworks Connector. This may damage your Laptop PC.*

The table below gives the pinout of the C-BOX 100 terminal block connectors. Use this pinout when the DS6500 reader is connected in a network by means of the C-BOX 100:

C-BOX 100 Terminal Block Connectors				
Power				
1, 3, 5	VS			
2, 4, 6	GND			
7, 8	EARTH GROUND			
20, 40	Reserved			
Inputs				
27	EXT TRIG/PS A (polarity insensitive) for PS			
28	EXT TRIG/PS B (polarity insensitive) for PS			
29	IN 2/ENC A (polarity insensitive) for Encoder			
30	IN 2/ENC B (polarity insensitive) for Encoder			
31, 33	IN 3A (polarity insensitive)			
32, 34	IN 4A (polarity insensitive)			
36	IN 3B/IN 4B Reference (polarity insensitive)			
Outputs				
21	OUT 1+			
22	OUT 1-			
23	OUT 2+			
24	OUT 2-			
25	OUT 3A (polarity insensitive)			
26	OUT 3B (polarity insensitive)			
Auxiliary Interface				
35	TX AUX			
37	RX AUX			
38, 39	GND			
Main Interface				
	RS232	**RS485 Full-Duplex**	**RS485 Half-Duplex**	**20 mA C.L.** (with INT-30 only)
11, 15	TX232	TX485+	RTX485+	
12, 16	RTS232	TX485-	RTX485-	
17	RX232	RX485+		see INT-30
18	CTS232	RX485-		instructions
10, 14, 19	SGND Main Isolated	SGND Main Isolated	SGND Main Isolated	
9, 13		RS485 Cable Shield	RS485 Cable Shield	

2.3.1 Main/Aux. Serial Interface and I/O Connector

The DS6500 master/slave model is equipped with a 25-pin male D-sub connector for connection to the host computer, power supply and input/output signals.

The DS6500 fieldbus models (Ethernet, DeviceNet, Profibus) adopt a 26-pin male connector instead of the 25-pin one.

The details of the connector pins are indicated in the following table:

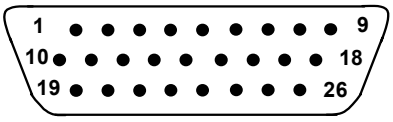


Figure 16 - 26-pin Connector

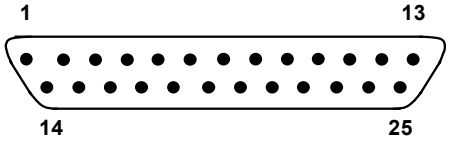


Figure 17 - 25-pin Connector

DS6500 25-pin/26-pin D-sub connector pinout		
Pin	**Name**	**Function**
1	CHASSIS	Chassis - internally connected to GND Cable shield connected to chassis
20	RXAUX	Receive data of auxiliary RS232 (referred to GND)
21	TXAUX	Transmit data of auxiliary RS232 (referred to GND)
8	OUT 1+	Configurable digital output 1 - positive pin
22	OUT 1-	Configurable digital output 1 - negative pin
11	OUT 2+	Configurable digital output 2 - positive pin
12	OUT 2-	Configurable digital output 2 - negative pin
16	OUT 3A	Configurable digital output 3 - polarity insensitive
17	OUT 3B	Configurable digital output 3 - polarity insensitive
18	EXT_TRIG/PS A	External trigger (polarity insensitive) for PS
19	EXT_TRIG/PS B	External trigger (polarity insensitive) for PS
6	IN 2/ENC A	Input signal 2 (polarity insensitive) for Encoder
10	IN 2/ENC B	Input signal 2 (polarity insensitive) for Encoder
14	IN 3A	Input signal 3 (polarity insensitive)
15	IN 4A	Input signal 4 (polarity insensitive)
24	IN_REF	Common reference of IN3 and IN4 (polarity insensitive)
9,13	VS	Supply voltage - positive pin
23,25,26*	GND	Supply voltage - negative pin

Main Interface Connector Pinout				
Pin	**RS232**	**RS485 Full Duplex**	**RS485 Half Duplex**	**20 mA C.L.** (INT-30 with C-BOX 100 only)
2	TX	TX485 +	RTX485 +	see INT-30 instructions
3	RX	RX485 +		
4	RTS	TX485 -	RTX485 -	
5	CTS	RX485 -		
7	GND_ISO	GND_ISO	GND_ISO	

* Pin 26 is only available for fieldbus models (Ethernet, DeviceNet, Profibus).

Main Interface

The main serial interface is compatible with the following electrical standards:

RS232

RS485 full-duplex

RS485 half-duplex

(20 mA current loop)

The 20 mA Current Loop interface is available by using the C-BOX 100 with the optional INT-30 accessory installed in it. The scanner communicates to the C-BOX 100 through the RS232 interface and the INT-30 converts the signals.

The main serial interface type and its relative parameters (baud rate, data bits, etc.) are selected via software using the Genius™ utility program. For more details refer to the section "Main Serial Port" in the Genius™ Help On Line.

Details regarding the connections and use of the main interface selection are given in the next paragraphs.

RS232 Interface

The main serial interface is used for communication with the Host computer and allows both transmission of code data and configuring the reader. The overall maximum cable length should not exceed 15 m (50 ft).

The following pins of the 25-pin and 26-pin connector are used for RS232 interface connection depending on the reader model:

Pin	Name	Function
2	TX	Transmit
3	RX	Receive
4	RTS	Request to send
5	CTS	Clear to send
7	GND-ISO	Main signal ground

The RTS and CTS signals control data transmission and synchronize the connected devices.

If the RTS/CTS hardware protocol is enabled, the DS6500 activates the RTS output to indicate a message can be transmitted. The receiving unit must activate the CTS input to enable the transmission.

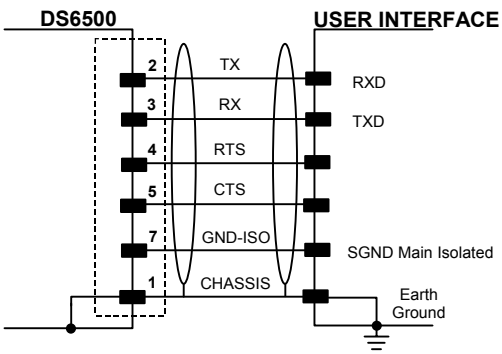


Figure 18 - RS232 Connections

RS485 Full-Duplex Interface

The RS485 full-duplex interface is used for non-polled communication protocols in point-to-point connections over longer distances than those acceptable for RS232 communications or in electrically noisy environments. The overall maximum cable length should not exceed 1200 m (3937 ft).

The following pins of the 25-pin and 26-pin connector are used for RS485 full-duplex interface connection:

Pin	Name	Function
2	TX485 +	RS485 output (+)
3	RX485 +	RS485 input (+)
4	TX485 -	RS485 output (-)
5	RX485 -	RS485 input (-)
7	GND-ISO	Main signal ground

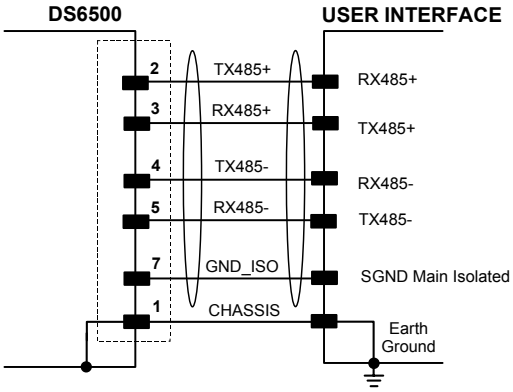


Figure 19 - RS485 Full-Duplex Interface Connections

RS485 Half-Duplex Interface

The RS485 half-duplex interface can be used for multidrop connections with a Datalogic multiplexer or it can also be used for a master/slave layout. The overall maximum cable length should not exceed 1200 m (3937 ft).

The following pins of the 25-pin and 26-pin connector are used for RS485 half-duplex interface connection:

Pin	Name	Function
2	RTX485 +	RS485 input/output (+)
4	RTX485 -	RS485 input/output (-)
7	GND-ISO	Main signal ground

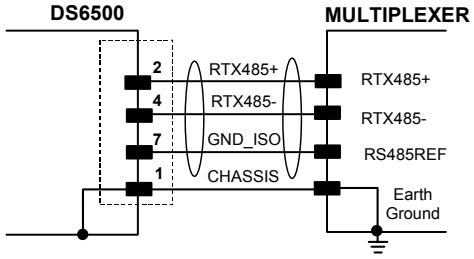


Figure 20 – RS485 Half-Duplex Interface Connections

Auxiliary Interface

The auxiliary serial interface is equipped with RS232 full-duplex interface connections. The interface type is exclusive and is selectable through the Genius™ configuration program. The overall maximum cable length should not exceed 15 m (50 ft).

The following pins of the 25-pin and 26-pin connector are used for RS232 full-duplex interface connection:

Pin	Name	Function
20	RXAUX	Receive data
21	TXAUX	Transmit data
23	SGND AUX	Auxiliary signal ground

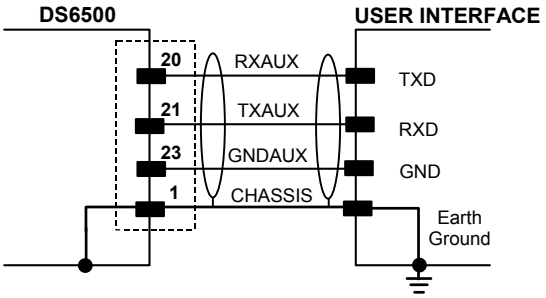


Figure 21 - RS232 Auxiliary Interface Connections

Inputs

The inputs of the reader are on the 25-pin and 26-pin connector (Figure D, 1 and Figure E, 1) of the DS6500.

These inputs are called EXT_TRIG/PS, IN2/ENC, IN3 and IN4.

Pin	Name	Function
18	EXT_TRIG/PS A	External trigger (polarity insensitive) for PS
19	EXT_TRIG/PS B	External trigger (polarity insensitive) for PS
6	IN2/ENC A	Input signal 2 (polarity insensitive) for Encoder
10	IN2/ENC B	Input signal 2 (polarity insensitive) for Encoder
14	IN3A	Input signal 3 (polarity insensitive)
15	IN4A	Input signal 4 (polarity insensitive)
24	IN_REF	Common reference of IN3 and IN4 (polarity insensitive)

IN2/ENC is normally used for the Encoder input. In PackTrack™ mode, it detects the conveyor speed. The maximum Encoder frequency is 2 KHz.

EXT_TRIG/PS is the main presence sensor. When active, this input tells the scanner to scan for a code and that decoding can take place. The yellow LED (Figure C, 3) indicates the EXT_TRIG/PS is active.

IN3 and IN4 can be used as the stop signal for the reading phase.

All inputs are optocoupled, polarity insensitive, and driven by a constant current generator; the command signal is filtered through an anti-disturbance circuit which generates a delay which can be set to 5 ms or 500 μs. In particular, EXT_TRIG/PS, IN3 and IN4 share the same value which usually corresponds to 5 ms when using a photoelectric sensor, while IN2/ENC has a different value which is set to 500 μs when this input is used for the Encoder.

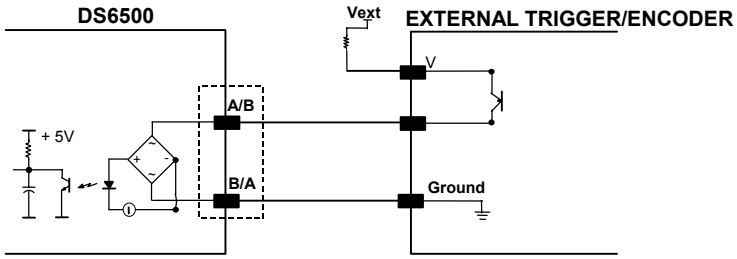


Figure 22 – PNP Command Input Connection using External Power

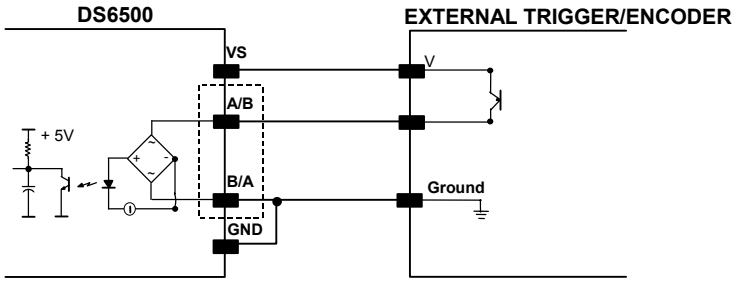


Figure 23 - PNP Command Input Connection using Scanner Power

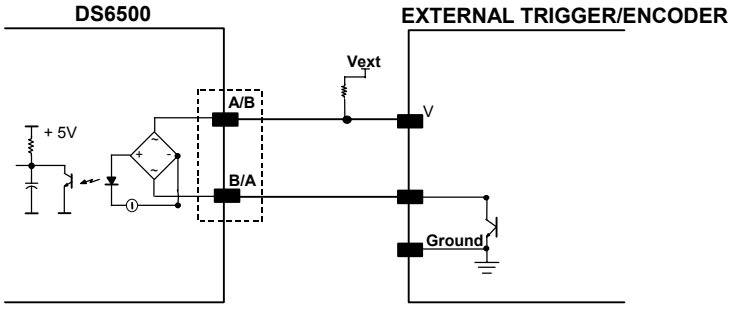


Figure 24 - NPN Command Input Connection using External Power

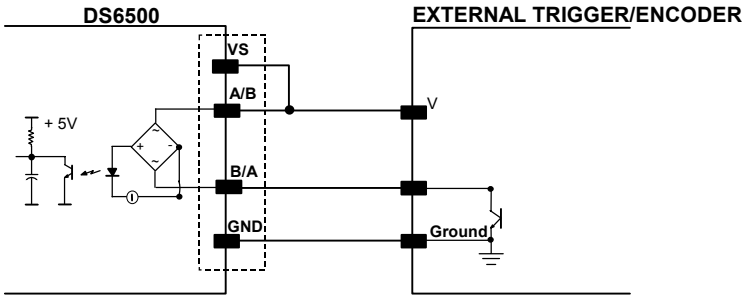


Figure 25 - NPN Command Input Connection using Scanner Power

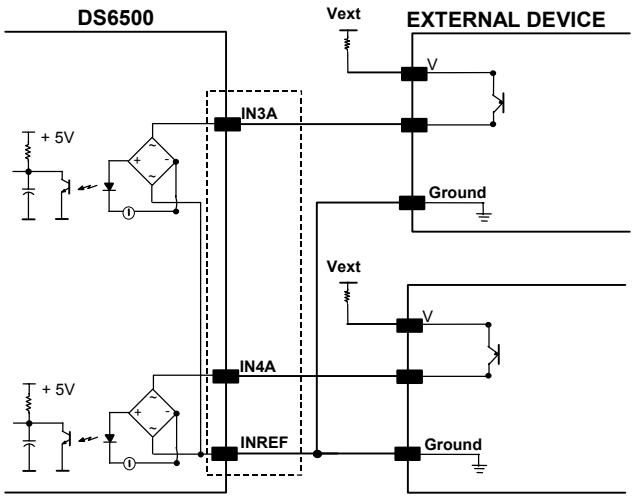


Figure 26 - IN3/IN4 PNP Input Command using External Power

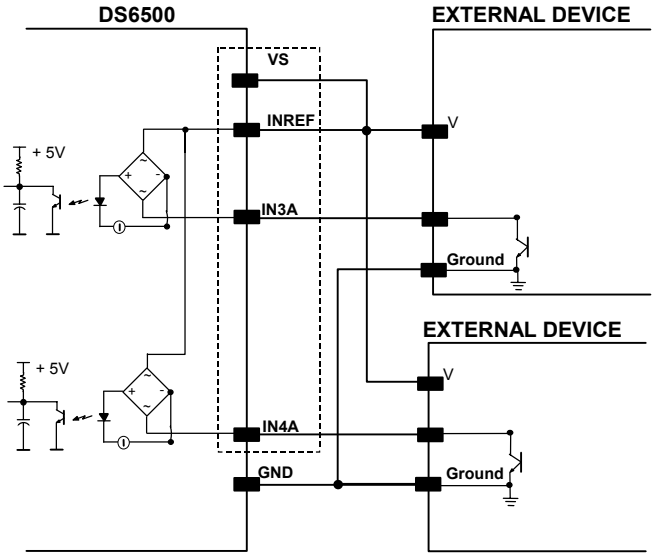


Figure 27 - IN3/IN4 NPN Input Command using Scanner Power

Input devices can be supplied by either scanner power (VS and GND) or external power supplies (Vext).

Electrical isolation between the input command logic and the scanner is maintained when powering the input devices from an external supply voltage (Vext).

The driving logic of the input signals may be powered, for convenience, with the voltage supply between pins 9 (VS) and 23 (GND) of the 26-pin I/O connector. In this case, however, the device is no longer electrically isolated.

The voltage available on the 26-pin I/O connector, is physically the same as used to power the scanner.

The electrical features of these inputs are:

Maximum voltage 30 V
Maximum current 10 mA

Outputs

Three general purpose outputs are available.

Pin	Name	Function
8	OUT 1+	Configurable digital output 1 – positive pin
22	OUT 1-	Configurable digital output 1 – negative pin
11	OUT 2+	Configurable digital output 2 – positive pin
12	OUT 2-	Configurable digital output 2 – negative pin
16	OUT 3A	Configurable digital output 3 – polarity insensitive
17	OUT 3B	Configurable digital output 3 – polarity insensitive

The function of the three outputs OUT1, OUT2 and OUT3 can be defined by the user.
Refer to Genius™ Help On-Line for further details.

By default, OUT1 is associated with COMPLETE READ event, which activates when the code has been read correctly. In case the reader has been programmed to read several codes within the same reading phase, the event activates when all codes have been read.

OUT2 is associated with NO READ event, which activates when no code has been read.

OUT3 is associated with NONE, which means that the output is always in Line State.

The OUT1 and OUT2 electrical features are given below:

Collector-emitter voltage	30 V Max.
Collector current (pulse)	130 mA Max.
Collector current (continuous)	40 mA Max.
Saturation voltage (VCE)	1 V at 10 mA Max.
Maximum power dissipation	90 mW at 50°C (Ambient temperature).

The limit requested by the maximum power dissipation is more important than that of the maximum collector current: if one of these outputs is continuously driven, the maximum current must not be more than 40 mA although 130 mA may be reached in pulse conditions.

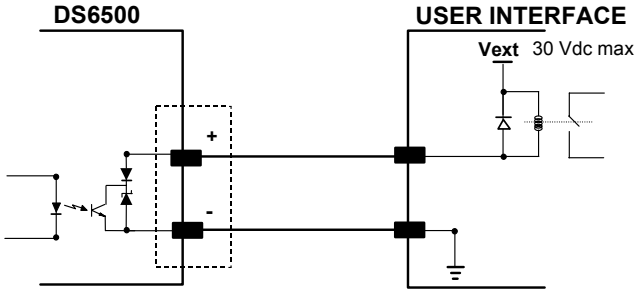


Figure 28 – Output 1 and Output 2 Interface

When the load is powered by an external power supply, the voltage must be less than 30 V.

OUT3 has different electrical features, since it is a bi-directional solid state relay with built-in current limit protection. If this output is continuously driven, the maximum current must be not more than 200 mA although more than 300 mA may be reached in pulse conditions for an ambient temperature of 25°C. At the maximum ambient temperature of 50°C the maximum respective current is 150 mA continuous and 240 mA pulse.

The OUT3 electrical features are given below:

Maximum voltage	± 100 V
Collector current (pulse)	240 mA Max.
Collector current (continuous)	150 mA Max.
R on	6 – 15 Ω
R off	> 500 Ω
Off-state leakage current	< 1 µA
Maximum power dissipation	550 mW at 50°C (Ambient temperature).

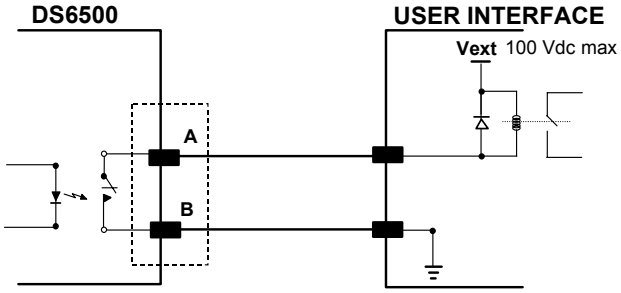


Figure 29 – Output 3 Interface

The command signal is filtered and generates a delay of about 50 µs for OUT1 and OUT2 and 1 ms for OUT3.

2.3.2 Lonworks Connectors

CAUTION

Do not connect an RS232 port to the 9-pin Lonworks Connector. This may damage your Laptop PC.

The local network used by DS6500 exploits a Lonworks standard communication system requiring only two wires (polarity insensitive) to enable a connection. The connector also provides a positive and a negative supplying wire. In this way, all the slave readers can be powered by the master through the Datalogic standard cables.

When working in applications requiring enhanced synchronization capabilities, the DS6500 master reader (output) transmits two system signals named Sys_I/O and Sys_Enc_I/O to the slave readers (input). For example, when working with applications requiring an encoder the signal is received by the master and directly transmitted to the slaves through the cable.
The internal circuits generating the system signals are externally supplied by means of the VS_I/O and REF_I/O pins and are isolated from the reader supply voltage.

The use of these system circuits is not required in all the operating modes (see par. 2.7 for details). Anyway, for a correct system functioning it is suggested to use Datalogic cables and accessories and follow the description of the typical layout (see par. 2.7 for details).

Figure 30 – 9-pin Local Lonworks Connectors

DS6500 9-pin Lonworks connector pinout		
Pin	**Name**	**Function**
1	CHASSIS	Cable shield internally connected by capacitor to chassis
9	VS	Supply voltage - positive pin
2	GND	Supply voltage - negative pin
6	VS_I/O	Supply voltage of I/O circuit
3	Ref_I/O	Reference voltage of I/O circuit
4	SYS_ENC_I/O	System signal
5	SYS_I/O	System signal
7	LON A	Lonworks line (polarity insensitive)
8	LON B	Lonworks line (polarity insensitive)

Network Termination

When building a Lonworks system the network must be properly terminated by positioning BTK-6000 terminator in the DS6500 master reader and in the last DS6500 slave reader.

Each side of the terminator provides a different connector; thus, it can be inserted either in the Lonworks 9-pin male connector of the master reader or in the Lonworks 9-pin female connector of the last slave reader:

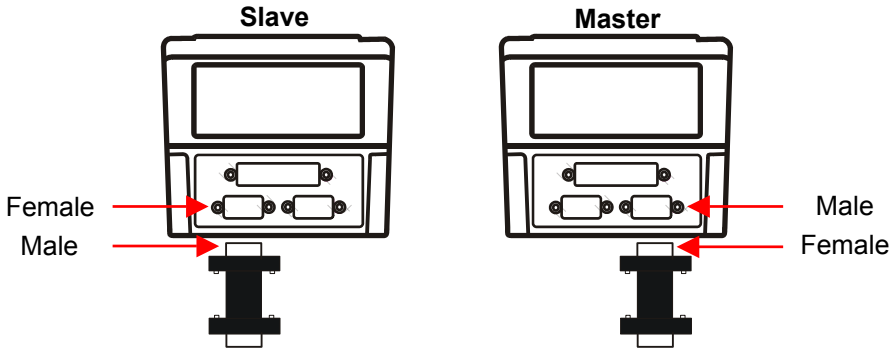


Figure 31 - BTK-6000 Network Terminator

NOTE

For Fieldbus models no terminator must be inserted in the reader, since it is internally integrated.

Lonworks Interface

The Lonworks network is used for both input and output connection to build a multi-sided or omni-station system connecting several readers.

The DS6500 master usually employs the 9-pin female connector for output connection to the first slave, while the 9-pin male one is terminated by inserting the BTK6000 terminator (see par. 2.7.2 for details). If creating a T network configuration, it is necessary to use both connectors to create the double branch line of slave readers.

Both connectors are always employed when connecting together the slave readers. In particular, the 9-pin female connector is used for output connection and the male one for input connection. The female connector is always terminated in the last slave reader to close the system network.

The following diagram represents the connection between a DS6500-XXX-010 working as master and a DS6500-XXX-010 working as a slave reader.

The cable shield for LON A/B is connected to pin 1 - CHASSIS.

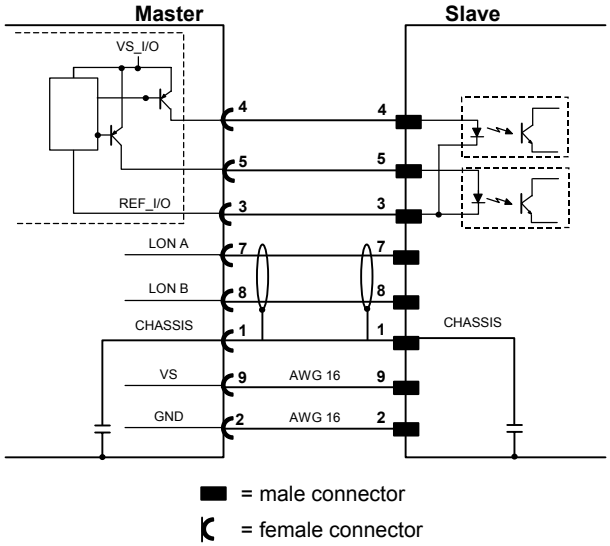


Figure 32 – DS6500-XXX-010 Master/Slave Lonworks Connection

CAUTION

*The maximum current to be propagated to the slave readers through the master is **2 A**.*
For this reason, it is suggested the use of a 24 V power supply allowing to supply up to three readers (master + 2 slaves).

The following diagrams represent different network terminations using the BTK-6000 terminator. In each diagram the terminator is indicated by the T element, while the figure below shows its electrical circuit in details:

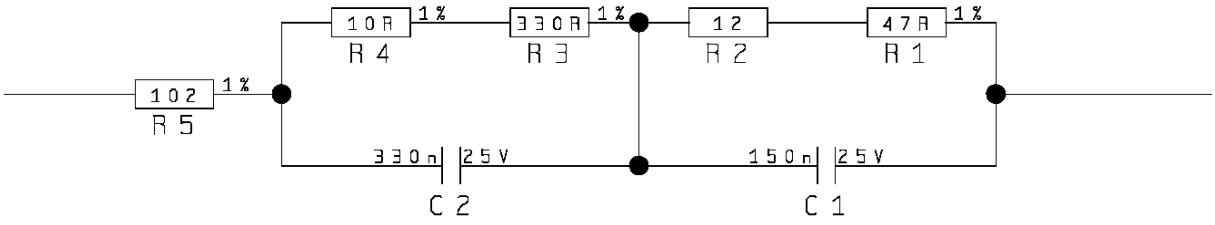


Figure 33 – BTK-6000 Electrical Circuit

The diagram below represents the termination of a DS6500-XXX-010 working as master by means of the BTK-6000 terminator.

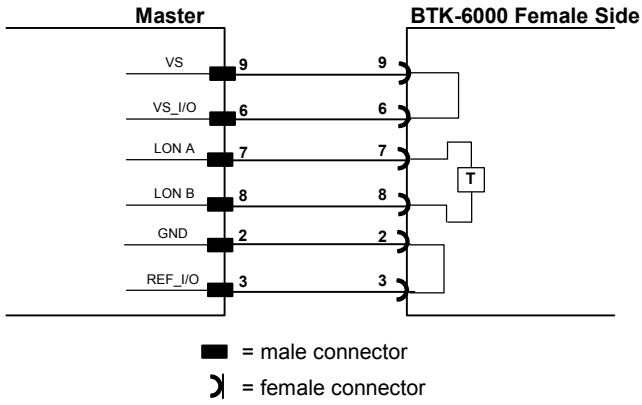


Figure 34 – DS6500-XXX-010 Master Termination

The diagram below represents the termination of a DS6500-XXX-010 working as slave by means of the BTK-6000 terminator.

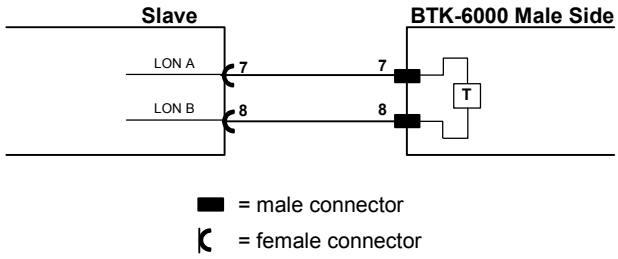


Figure 35 – DS6500-XXX-010 Slave Termination

The diagram below represents the connection between a DS6500 Fieldbus model, which always works as master, and a DS6500-XXX-010 working as a slave reader.

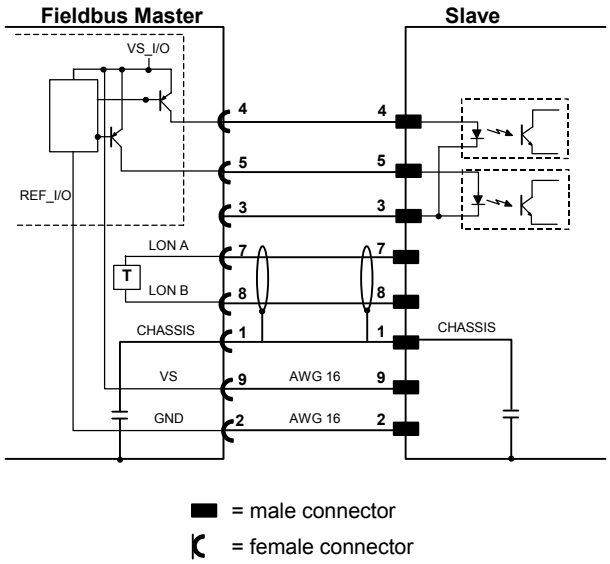


Figure 36 – DS6500-XXX-010 Master/Slave Lonworks Connection

2.3.3 Ethernet Connector

This connector is only available for DS6500 Ethernet models and allows the Ethernet connection between the host and the reader.

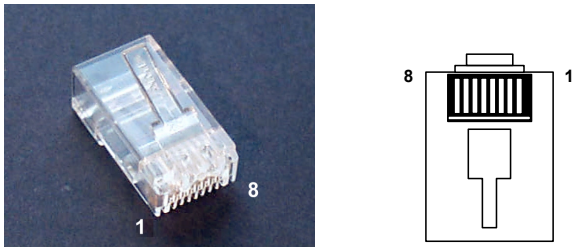


Figure 37 – Cable RJ45 Male Modular Connector

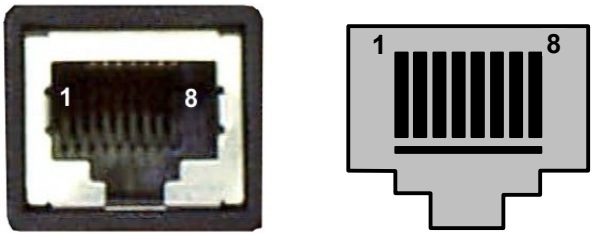


Figure 38 – DS6500 RJ45 Female Modular Connector

This interface and the connector pinout (see the following table) are IEEE 802.3 10 BaseT and IEEE 802.3u 100 Base Tx compliant.

RJ45 Modular Jack Pinout		
Pin	**Name**	**Function**
1	TX +	Transmitted data (+)
2	TX -	Transmitted data (-)
3	RX +	Received data (+)
6	RX -	Received data (-)
4, 5, 7, 8	N.C.	Not connected

In order to meet EMC requirements:

- use Eth shielded cable
- connect the Ethernet interface cable shield to the plant earth ground

NOTE

The cable shield must be connected to the chassis of both connectors. A ferrite (type Stewart 28A2029-0A0) may also be applied on the scanner side of the Ethernet cable to reduce electrical noise.

Ethernet Interface

The Ethernet interface (NIC) can be used for TCP/IP communication with remote or local host computer by connecting the scanner to a LAN as well as with a host PC directly connected to the scanner.

The following is an example of a connection to a LAN through a Hub using a straight through cable:

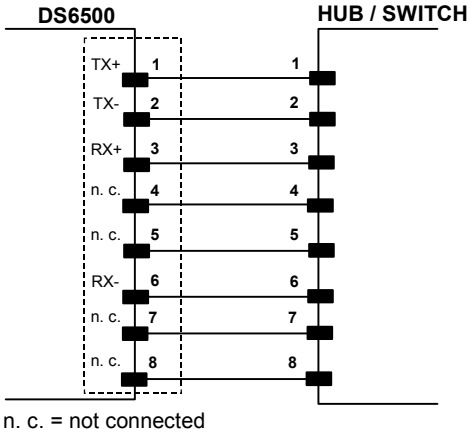


Figure 39 – Straight Through Cable

The following is an example of direct connection to a PC using an inverted cable:

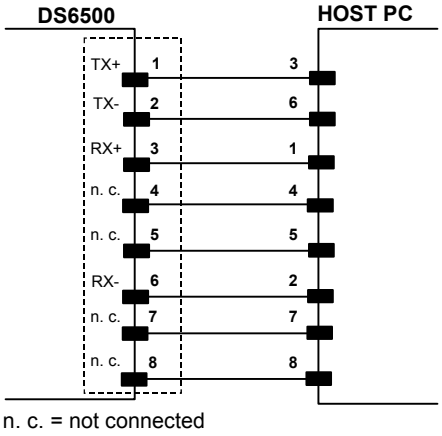


Figure 40 – Inverted Cable

For further details refer to the “Ethernet.pdf” document provided as reference documentation.

2.3.4 DeviceNet Connector

NOTE

When using DeviceNet, the Main serial interface is disabled and must not be physically connected.

The 5-pin male connector is only available in the DS6500 DeviceNet model and allows connection between the host and the reader:

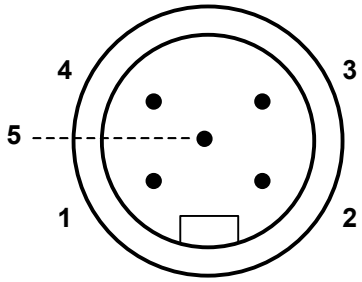


Figure 41 - DeviceNet 5-pin Male Connector

DS6500 5-pin DeviceNet connector pinout		
Pin	**Name**	**Function**
2	V +	Supply voltage – positive pin
5	CAN_L	CAN bus data line – L
1	SHIELD	Shield
4	CAN_H	CAN bus data line – H
3	V -	Supply voltage – negative pin

NOTE

The power supplied on pin V+ and V- is used only to propagate power to the section of the DeviceNet board directly connected to the Bus. It is completely isolated from the DS6500 power which must be supplied on pin 9, 13 and pin 23, 25 of the 26-pin Main/Aux connector.

2.3.5 Profibus Connector

The 9-pin Profibus female connector (white) is only available in the DS6500 Profibus model and allows connection between the host and the reader:

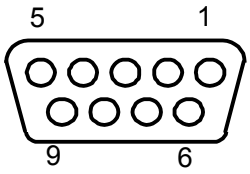


Figure 42 - Profibus 9-pin Female Connector

DS6500 9-pin Profibus connector pinout		
Pin	**Name**	**Function**
1	Shield*	Shield, Protective Ground resp.
2	Free	
3	B-LINE (RxD/TxD-P)	Received/Transmitted Data-P
4	CNTR-P**	Repeater Control Signal
5	DGND	Data Ground (M5V)
6	+5 V	Voltage Plus (P5V)
7	Free	
8	A-LINE (RxD/TxD-N)	Received/Transmitted Data
9	CNTR-N**	Repeater Control Signal

* signal is optional

** signal is optional; RS485 level

Profibus Interface

The Profibus interface is used for communication with an Host and allows expanding the networking and remote diagnostic capabilities of the scanner.

For further details refer to the “Profibus_Fam6k.pdf” document provided as supplementary documentation.

2.3.6 Power Supply

The supply voltage of a single scanner must be between 15 and 30 VDC.

Datalogic strongly recommends a minimum 24 VDC supply voltage when using a master/slave configuration.

The power consumption of the different DS6500 models is slightly different.
In particular, when connecting several DS6500 readers in a master/slave connection, the typical power consumption for each scanner is 15 W. There is a power peak of about 20 W lasting 5..10 seconds caused by the motor starting.

A security system allows the laser to activate only once the motor has reached the correct rotational speed; consequently, the laser beam is generated after a slight delay from the power on of the scanner.

Note that GND is internally connected to chassis. The cable shield is also connected to pin 1 - CHASSIS.

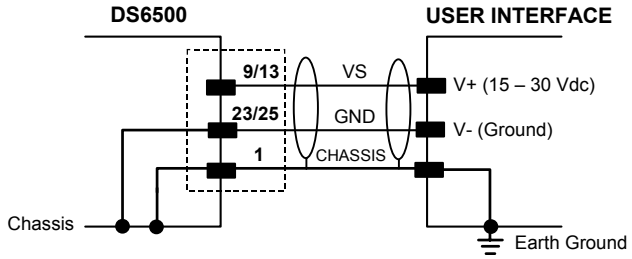
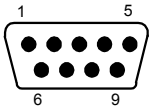
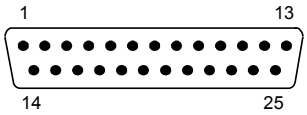


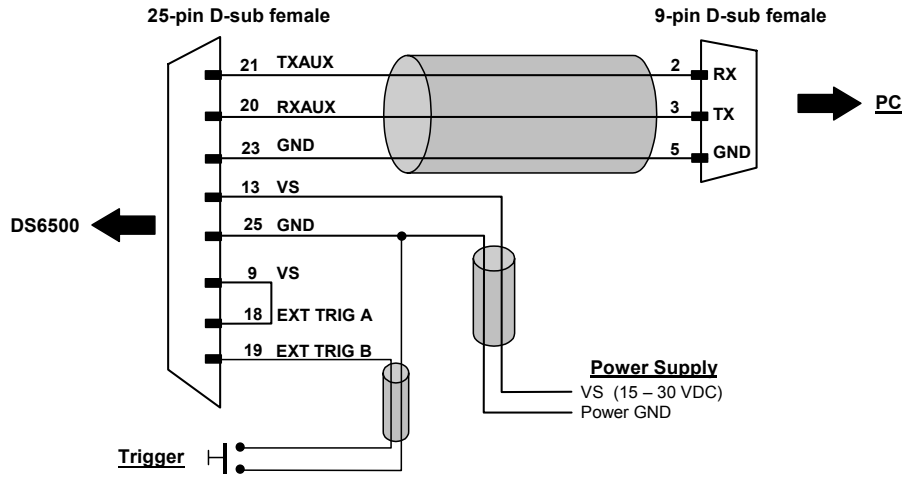
Figure 43 – Power Supply Using the 25/26-pin Connector

2.4 USER INTERFACE

RS232 PC-side connections			
 9-pin male connector		 25-pin male connector	
Pin	**Name**	**Pin**	**Name**
2	RX	3	RX
3	TX	2	TX
5	GND	7	GND
7	RTS	4	RTS
8	CTS	5	CTS

How To Build A Simple Interface Test Cable:

The following wiring diagram shows a simple test cable including power, external (push-button) trigger and PC RS232 COM port connections.



Test Cable for DS6500

2.5 POSITIONING THE SCANNER

The DS6500 reader is able to decode moving barcode labels at a variety of angles, however significant angular distortion may degrade reading performance.

When mounting DS6500 take into consideration these three ideal label position angles: **Pitch 0°**, **Skew 10° to 30°** and **Tilt 0°**.

Follow the suggestions for the best orientation:

The **Pitch** angle is represented by the value **P** in Figure 44. Position the reader in order to minimize the Pitch angle.

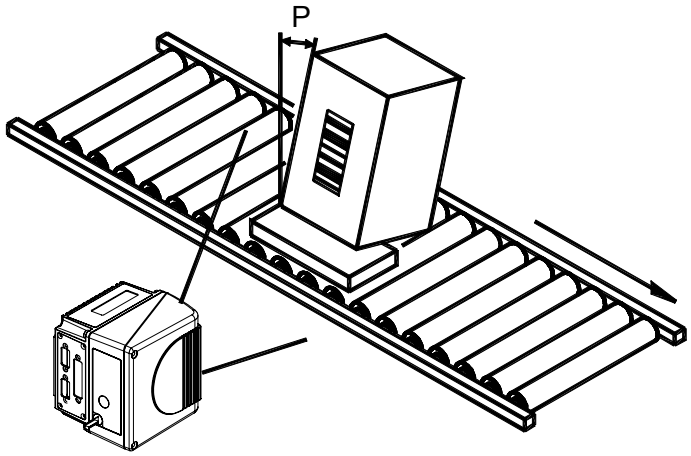


Figure 44 - "Pitch" Angle

The **Skew** angle is represented by the value **S** in Figure 45. Position the reader to **assure at least 10°** for the **Skew** angle. This avoids the direct reflection of the laser light emitted by the scanner.
For oscillating mirror models, this angle refers to the most inclined or external laser line, so that all other laser lines assure more than 10° Skew.

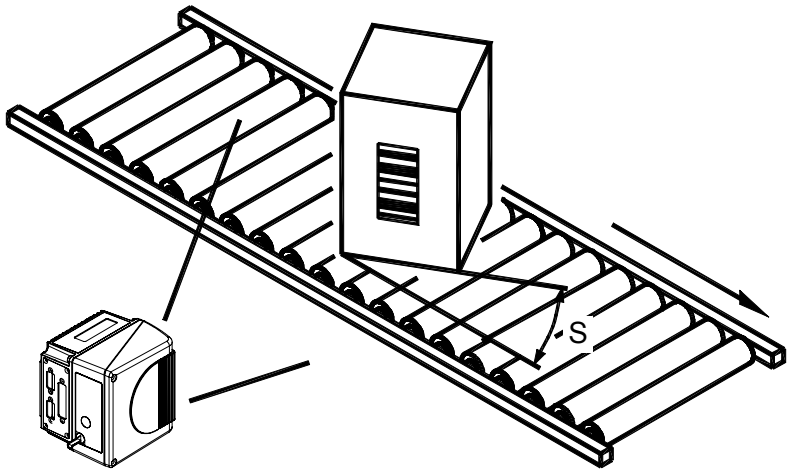


Figure 45 - "Skew" Angle

The **Tilt** angle is represented by the value **T** in Figure 46.

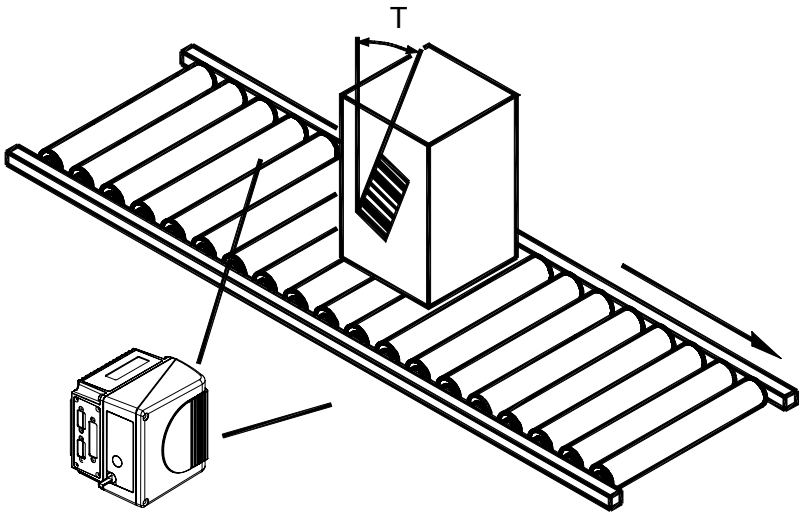


Figure 46 - "Tilt" Angle

2.6 TYPICAL INSTALLATIONS

2.6.1 Standard Installation

The DS6500 scanner is mounted on the ST-237 106° mounting bracket (see Figure 9) which guarantees a built-in Skew angle (**S** in the figure below) of 16° with respect to the frame plane (typically the Skew angle should be between 10° - 20°). This avoids the direct reflection of the laser light emitted by the scanner. Furthermore, the bracket guides allow adjusting the Tilt angle (**T** in the figure below, which is typically 0°) for the best scanner orientation:

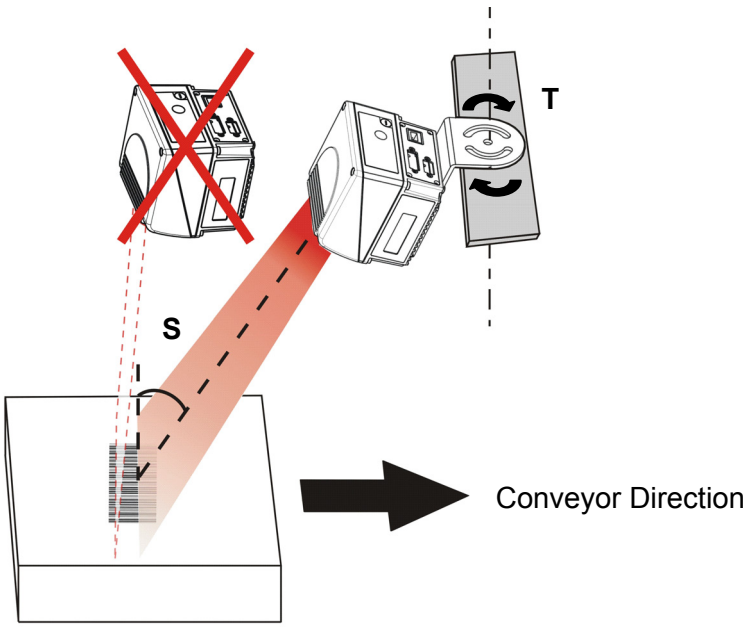


Figure 47 – Standard Installation

2.6.2 "45° Skew" Installation

The DS6500 scanner is mounted on the ST-210 90° mounting bracket (see Figure 11). By adjusting the mounting bracket guides, reach 45° for the Skew angle (**S** in the figure below) to avoid the direct reflection of the laser light emitted by the scanner:

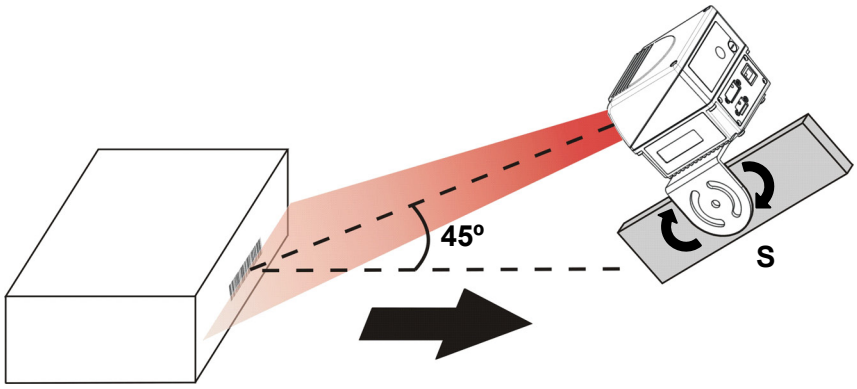


Figure 48 – 45° Skew Installation

ATTENTION

If using the "45° Skew" installation, it is not guaranteed that the scanner reading performance (see reading diagrams in par. 4.5.1) will match that measured for the standard installation with Skew angle between 10° - 20°.

NOTE

The ST-210 mounting bracket is an accessory of the DS6500 standard model available in the US-60 kit (890001020).

2.7 TYPICAL LAYOUTS

The DS6500 scanners can be connected in a variety of layouts depending on the number of scanners used and the required complexity of the reading station. These layouts range from Single Stand Alone to Complex Lonworks Networks.

Several power supplies are available to power the reading stations. Photoelectric sensors used as code presence sensors and optical encoders to signal conveyor speed are also available accessories.

The following typical layouts refer to the system hardware configurations, but they also require the correct setup of the software configuration parameters (see par. 3.2 for details).

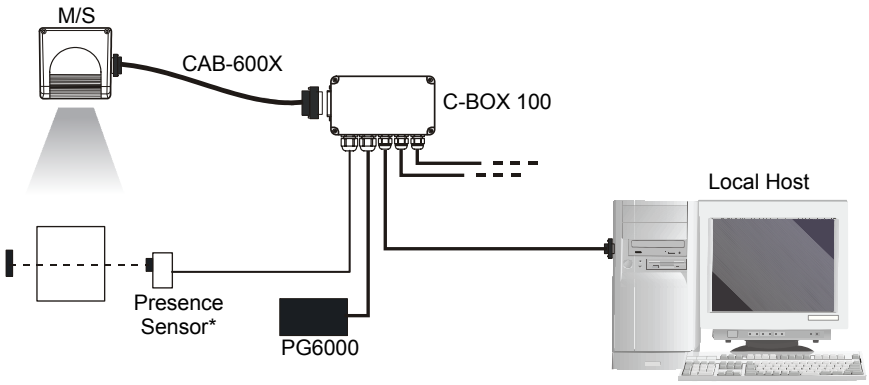
The accessories and cables indicated in the following figures are Datalogic products. We suggest their use to guarantee the correct system functioning.

2.7.1 Point-to-Point

Using a Point-to-Point layout, the data is transmitted on the Main interface as well as on the Auxiliary interface. The Main interface can be selected for RS232 or RS485 full-duplex communications.
Two different layouts are available according to the DS6500 reader model used for the connection.

Master/Slave Models

When On-Line operating mode is used, the reader is activated by an External Trigger (photoelectric sensor) when the object enters its reading zone. In the following case, the signal is passed to the DS6500 by the C-BOX 100, which also supplies the system.



* P.S. (Presence Sensor) connected to External Trigger/PS input.

Figure 49 – Point-to-Point for Master/Slave Models

Fieldbus Models

In this case no External Trigger is used and the C-BOX 100 only supplies the reader. The DS6500 (Ethernet, DeviceNet or Profibus model) is connected to a fieldbus remote Host. It can be activated by a signal generated by the remote Host or be always active if working in Automatic operating mode.

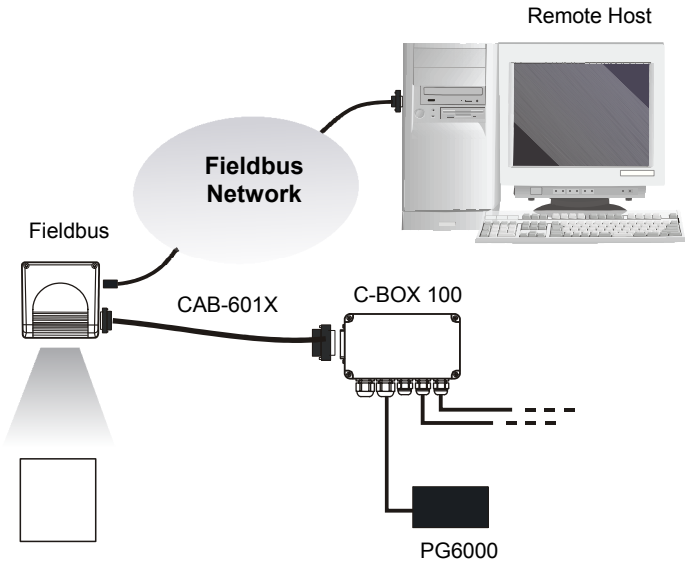


Figure 50 – Point-to-Point for Fieldbus Models

2.7.2 Pass Through

When Pass Through is activated on the Auxiliary interface, the DS6500 reader (all models) can be integrated in a network consisting of different scanners not provided with a Lonworks interface.

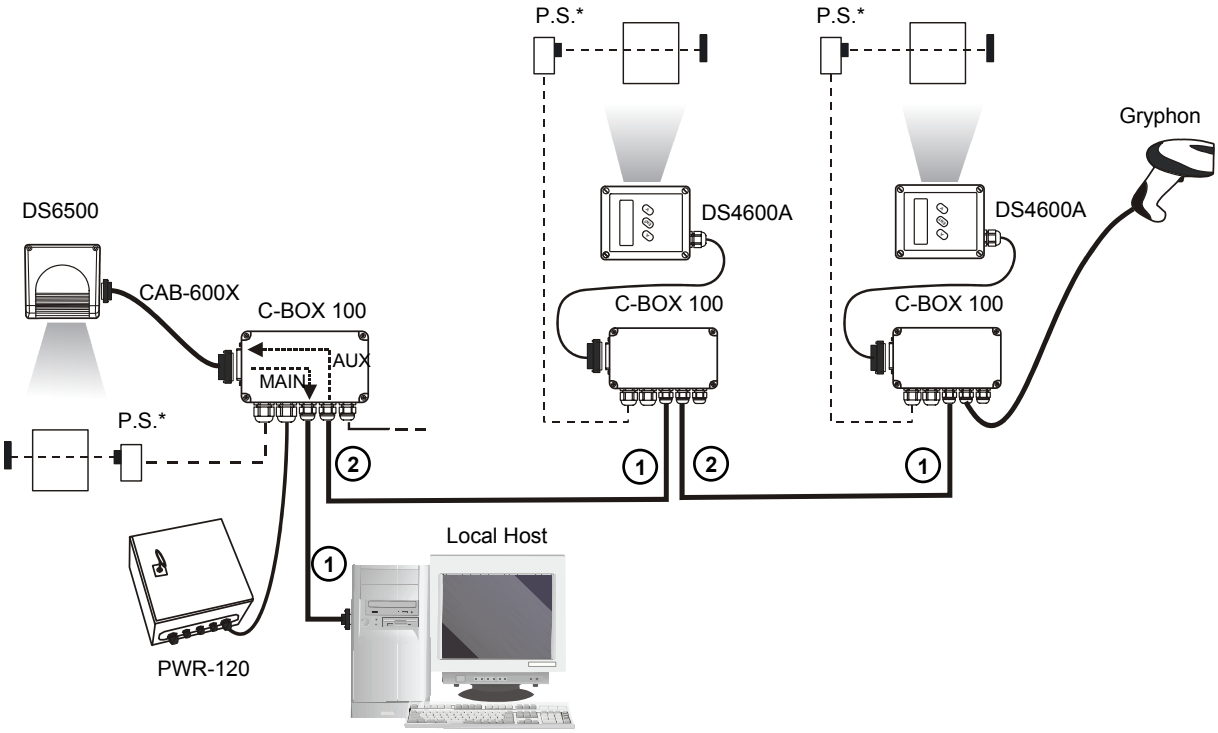
This connection mode allows two or more devices to be connected to a single external serial interface. The DS6500 transmits the messages received by its auxiliary interface (RS232 only) onto its main interface.

In this configuration a series of scanners can be connected together using RS232 on the main interface and all messages will be passed through this chain to the host. The reading phase of each scanner is independent from the others. In Pass Through connections each scanner is provided with its relative External Trigger (multi P.S.).

Applications can be implemented to connect a device such as a hand-held reader to the Auxiliary port for manual code reading capability.

For the RS232 connections the maximum cable length is 15 m (50 ft).

The DS4600A scanners represented in the following figures are configured in Pass Through mode.

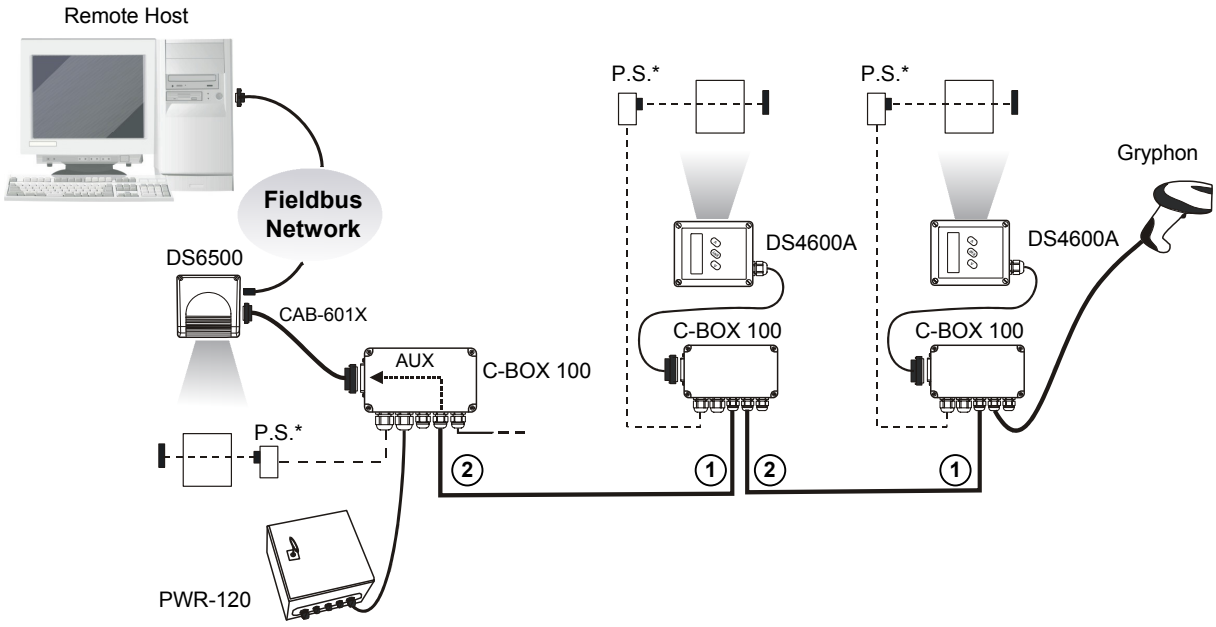


(1) Main Serial Interface

(2) Auxiliary Serial Interface

* P.S. (Presence Sensor) connected to External Trigger/PS input.

Figure 51 – Pass Through Connection for DS6500 Master/Slave Models



(1) Main Serial Interface

(2) Auxiliary Serial Interface

* P.S. (Presence Sensor) connected to External Trigger/PS input.

Figure 52 – Pass Through Connection for Fieldbus Models

2.7.3 RS232 Master/Slave

The RS232 master/slave connection is used to integrate a DS6500 reader (all models) in a network consisting of different scanners not provided with a Lonworks interface.

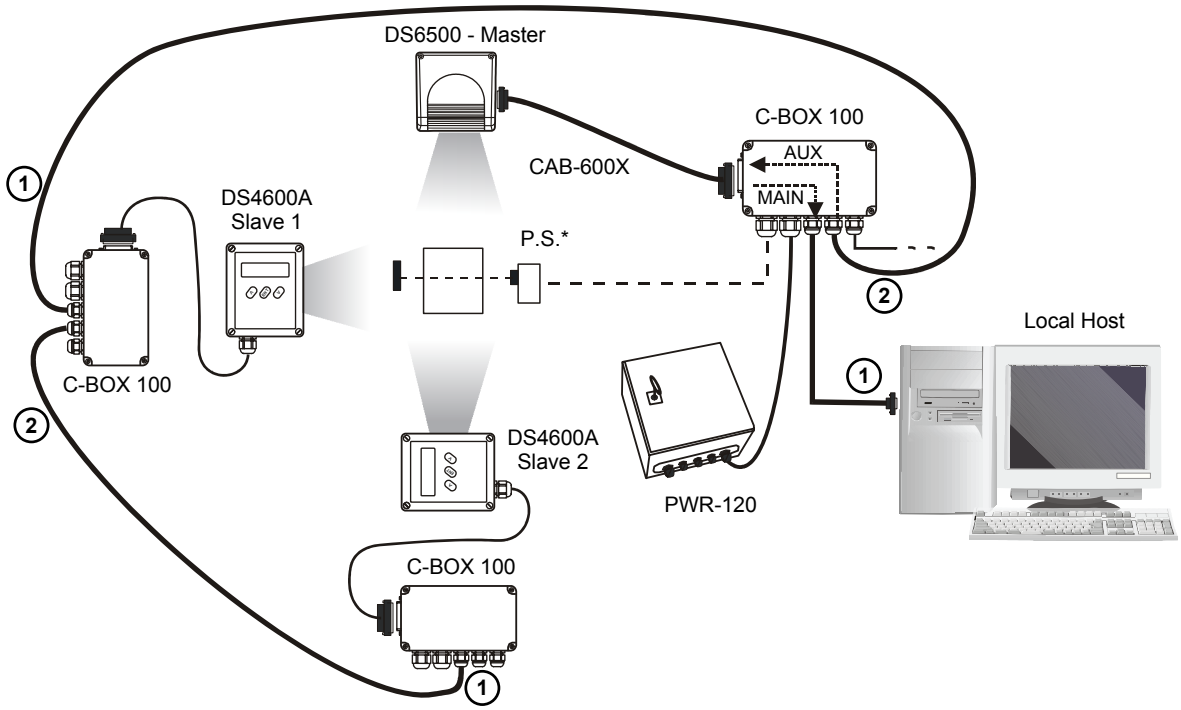
The Slave scanners use RS232 only on the main and auxiliary interfaces. Each slave scanner transmits the messages received by the auxiliary interface onto the main interface. All messages will be transferred towards the master.

The master scanner is connected to the Host PC on the main RS232 serial interface through the C-BOX 100 (20 mA C.L. can be used if the INT-30 accessory is installed).

In RS232 Master/Slave connections the External Trigger signal is unique to the system (single P.S.).

NOTE

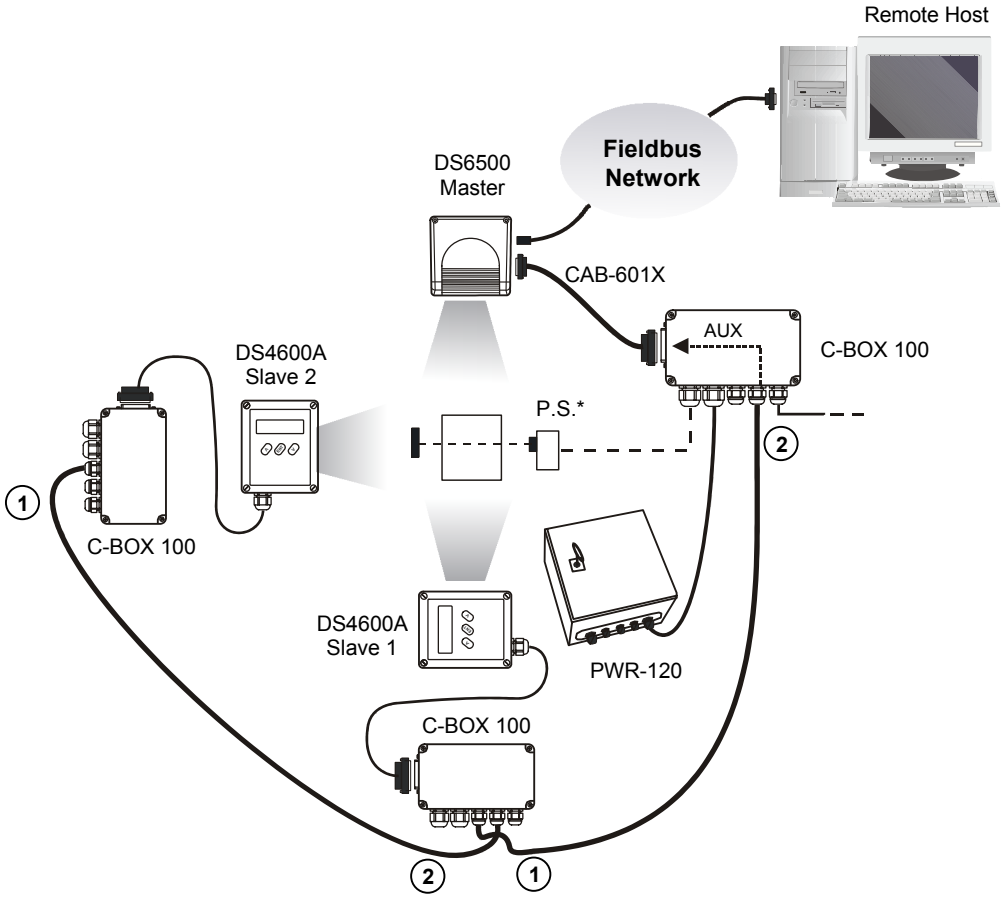
*The **DS6500 master/slave scanner model** (DS6500-10X-**010** only), working as Master in an RS232 network, may be simultaneously connected to a Lonworks network consisting of DS6500 slave scanners. Be careful when assigning the slave address, since the number of the first Lonworks slave must be a progressive number with respect to the address number defined for the last slave scanner of the RS232 network. For example, if the RS232 network consists of Slave 1 and Slave 2, the address to be assigned to the first Lonworks slave scanner will be Slave 3 (not Slave 1).*



① Main Serial Interface ② Auxiliary Serial Interface

* P.S. (Presence Sensor) connected to External Trigger/PS input.

Figure 53 – RS232 Master/Slave for DS6500 Master/Slave Models



① Main Serial Interface ② Auxiliary Serial Interface

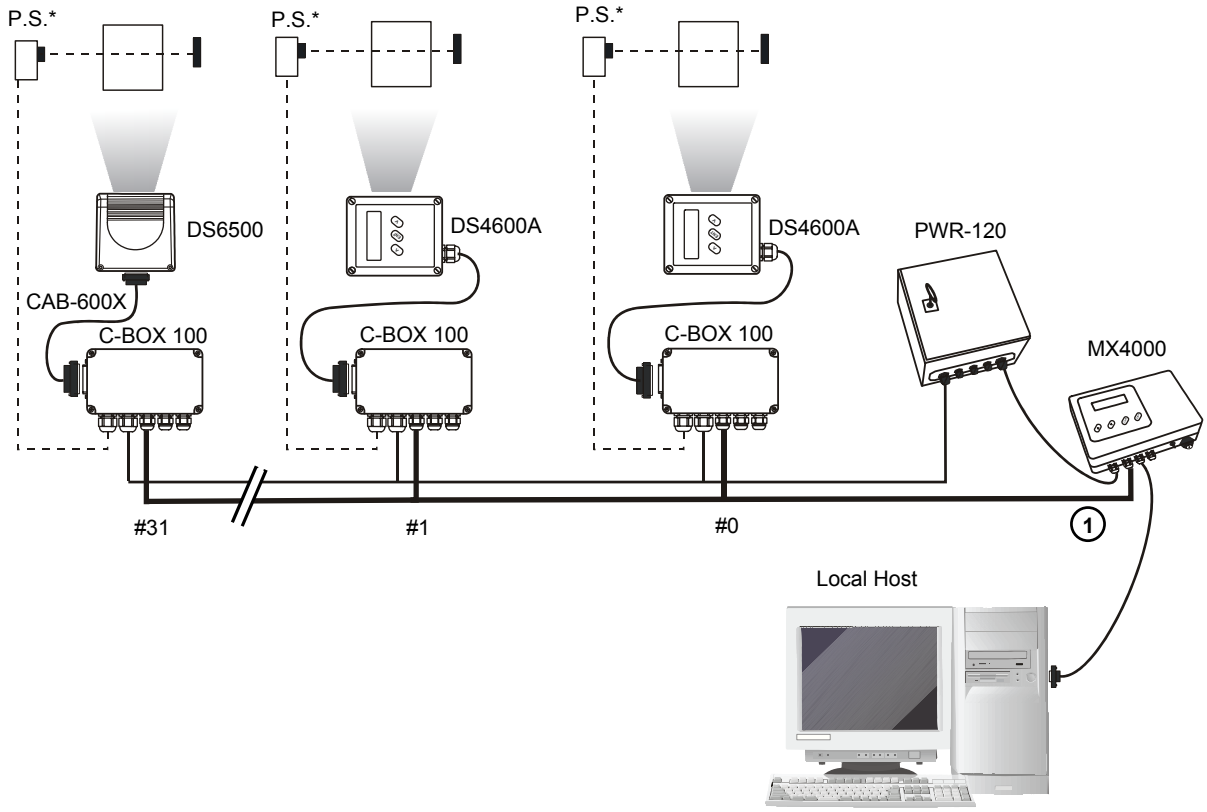
* P.S. (Presence Sensor) connected to External Trigger/PS input.

Figure 54 – RS232 Master/Slave for DS6500 Fieldbus Models

2.7.4 Multiplexer

The Multiplexer connection is used to integrate a DS6500 slave reader in a Multidrop network consisting of different scanners not provided with a Lonworks interface.

Each scanner is connected to a Multiplexer (MX4000) with the RS485 half-duplex main interface.



(1) RS485 HD Main Interface

* P.S. (Presence Sensor) connected to External Trigger/PS input.

Figure 55 – Multiplexer for DS6500 Master/Slave Models

The auxiliary serial interface of the slave scanners can be used to visualize collected data or to configure it using the Genius™ utility.

When On-Line operating mode is used, the scanner is activated by an External Trigger when the object enters its reading zone.

2.7.5 Local Lonworks Network

A local Lonworks network allows logically connecting a DS6500 master reader with up to 31 DS6500 slaves. Actually, the maximum number of readers to be employed in the network depends on the system operating conditions; that is adopted operating mode and amount of data stream.

When creating your network, always keep in mind the following guidelines:

- the Lonworks network logically supports a maximum number of 32 devices (master + slaves);
- it is recommended to adhere to the 8-in-16 rule (not more than 8 devices in any 16 meter bus segment;
- for DS6500 scanners the total bus length may extend up to 130 m (426 ft);
- the maximum number of DS6500 readers supported also depends on the type of power propagation adopted by the system (see the specific power supply installation manual for details).

Typically the layouts can be divided into Synchronized (single P.S.) or Multidata (multi P.S.) networks. They can be small (up to 10 scanners) or large (more than 10 scanners).

Contact Datalogic S.p.A., if your network requires a higher number of readers or in case the application throughput is very high.

For further information on Lonworks network cabling and connections see the “LonWorks® TPT Twisted Pair Transceiver Module User’s Guide”, available from the website: www.echelon.com.

NOTE

For some DS6500 Lonworks Network layouts power is propagated through the scanners. For these layouts a special setting is required in C-BOX 100 to pass scanner power to the presence sensor, encoder, etc.

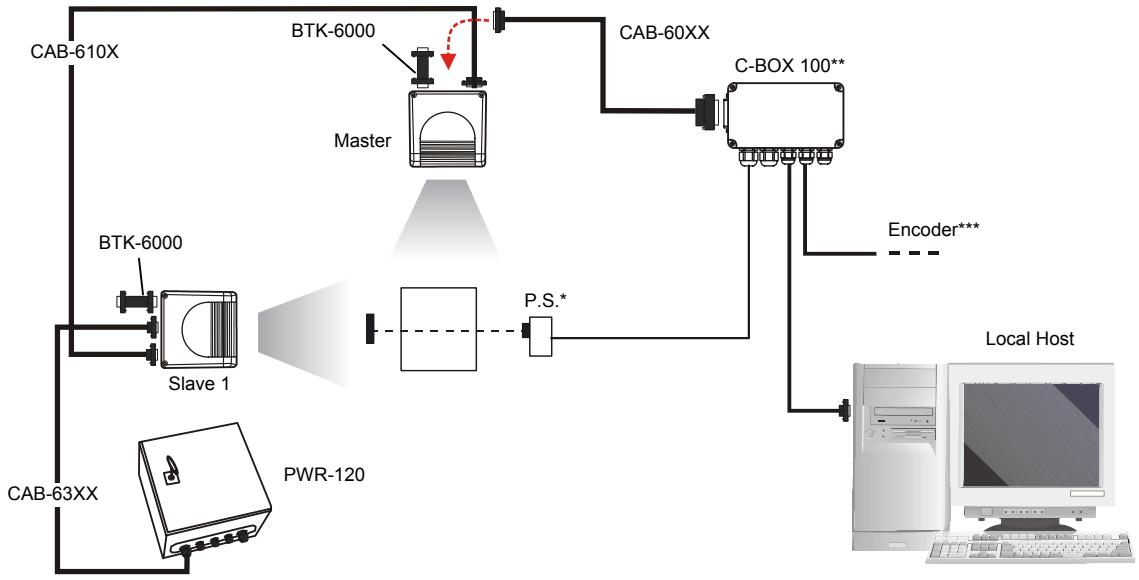
Small Synchronized Network

When building a small local Lonworks network (less than 10 scanners), the DS6500 master reader must be connected to a local host computer or a C-BOX 100 by means of a CAB-60XX cable connected to the 25-pin or 26-pin D-sub male connector.

The master reader connects to the first slave reader of the system through the local Lonworks 9-pin female connector. For Master/Slave models, the local Lonworks 9-pin male connector must be properly terminated by inserting the BTK-6000 Lonworks terminator. Fieldbus models are provided with an internal Lonworks terminator.

The slave readers are connected together through the local Lonworks connectors. Only the 9-pin female connector of the last slave reader must be terminated by the BTK-6000 terminator.

The presence sensor is connected and powered through the C-BOX 100 by the scanner and is unique to the system. There is only a single reading phase and a single message from the master reader to the Local Host. The **On-Line** operating mode is used for this layout.



* P.S. (Presence Sensor) connected to External Trigger/PS input.

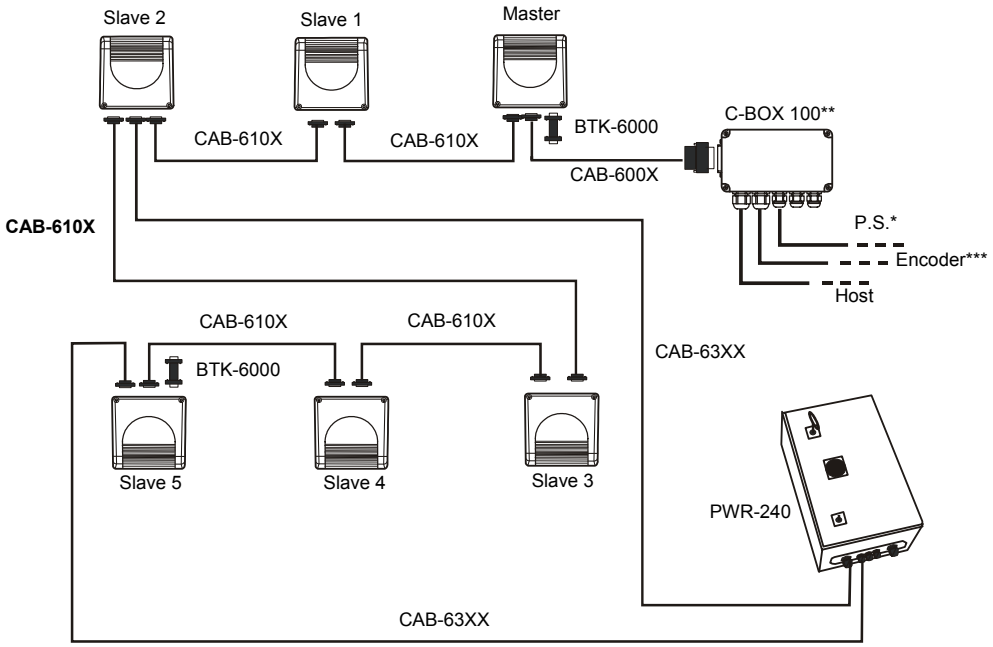
** C-BOX 100 modified to accept scanner power.

*** Encoder connected to IN2/ENC input.

Figure 56 - Small Synchronized Network with 2 Readers

The following image shows a system consisting of six readers where:

- the system is powered by the PWR-240
- the master and all slaves are connected together through the CAB-610X cables
- the external signals (trigger, encoder, serial to host, etc.) are connected to the master through the C-BOX 100
- one or more slaves are connected through CAB-63XX. The last slave must be terminated with the BTK-6000



* P.S. (Presence Sensor) connected to External Trigger/PS input.

** C-BOX 100 modified to accept scanner power.

*** Encoder connected to IN2/ENC input.

Figure 57 - Small Synchronized Network with more than 2 Readers and Single Power Unit

NOTE

If a single power source is used, it is not necessary to separate groups of scanners with "no power" cables (CAB-611X).

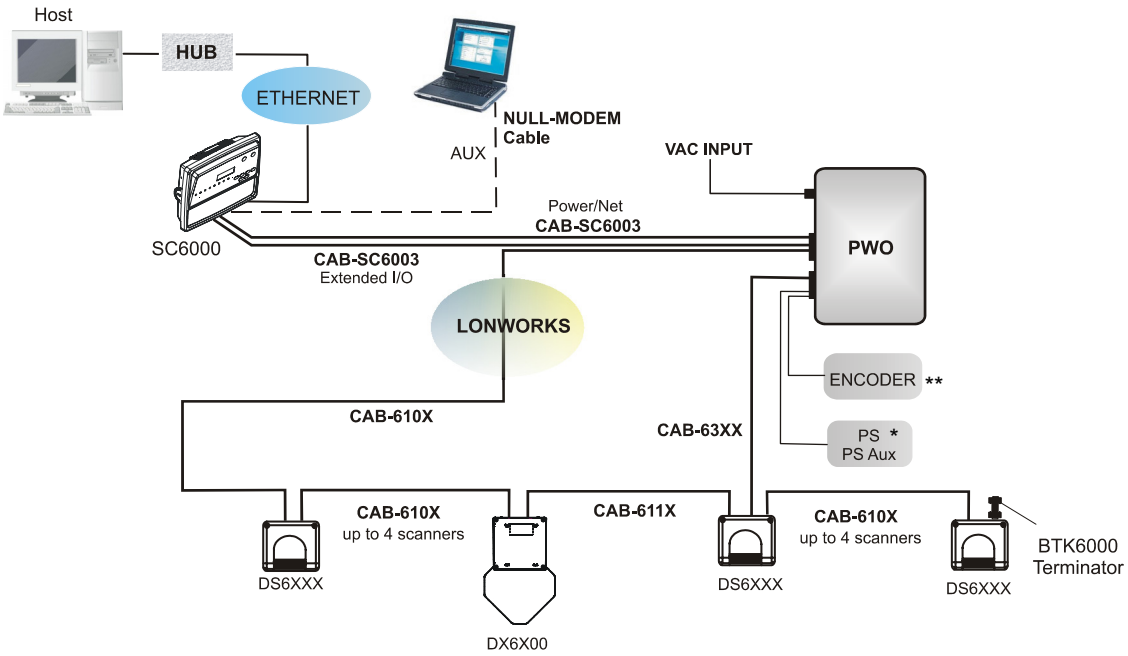
Large Synchronized Network

When building a large local Lonworks network (more than 10 scanners), an SC6000 Controller must be used together with a PWO power supply/junction box unit. In this case the SC6000 unit acts as the system master and is connected to the host through one of its interfaces.

All scanners act as slaves and are connected to the SC6000 through the PWO power supply/junction box. For DS6500 scanners, a single branch connector provides Lonworks communications between the scanners and the SC6000 unit. Power is distributed evenly by connecting groups of up to 4 Slave scanners through CAB-63XX cables. The last scanner on the line requires a Termination connector.

The allowed maximum bus length is 130 m.

External devices such as a presence sensor and an encoder are all connected to the PWO.



* P.S. (Presence Sensor) connected to External Trigger/PS input.

** Encoder connected to IN2/ENC input.

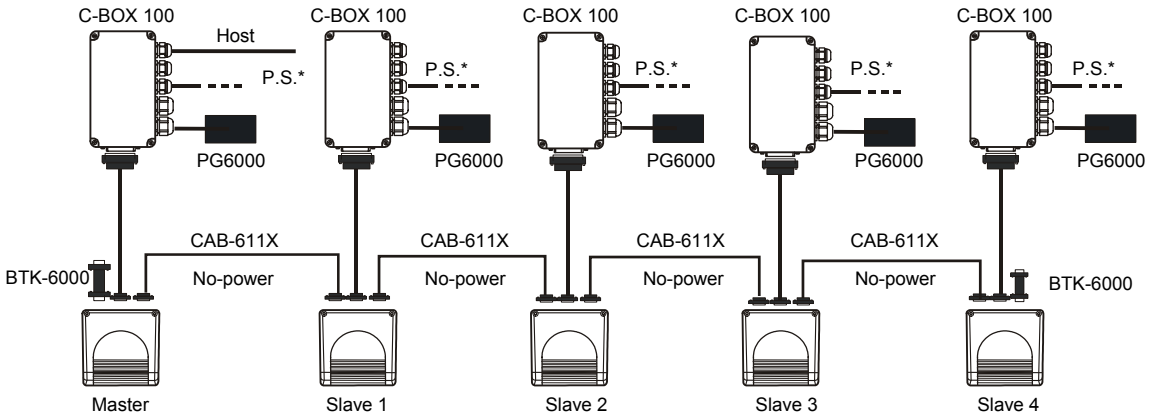
Figure 58 - Large Synchronized Network with DX6X00 and DS6XXX Scanners

Multidata Network

In this layout, one master and up to 7 DS6500 slave readers have their own P.S. and therefore multiple reading phases. Each P.S. is connected through a C-BOX 100, which in turn is connected to its relative scanner through a CAB-60XX cable.

The master sends all the individual messages collected from the Lonworks interface as well as its own to the Local Host through its C-BOX 100.

The following image shows a system consisting of five readers, which are all connected together using CAB-611X cables and each scanner is individually powered by PG6000 through C-BOX 100.



* P.S. (Presence Sensor) connected to External Trigger/PS input.

Figure 59 – Multidata Network

2.7.6 Fieldbus Network

The Fieldbus Ethernet model offers connectivity without any converter or adapter needed.

The DS6500 master Fieldbus communicates with a remote host (for ex. remote PC connected via Internet) by means of a cable connected to the Fieldbus connector provided. It can be activated by a signal generated by the remote Host or by a physical presence sensor.

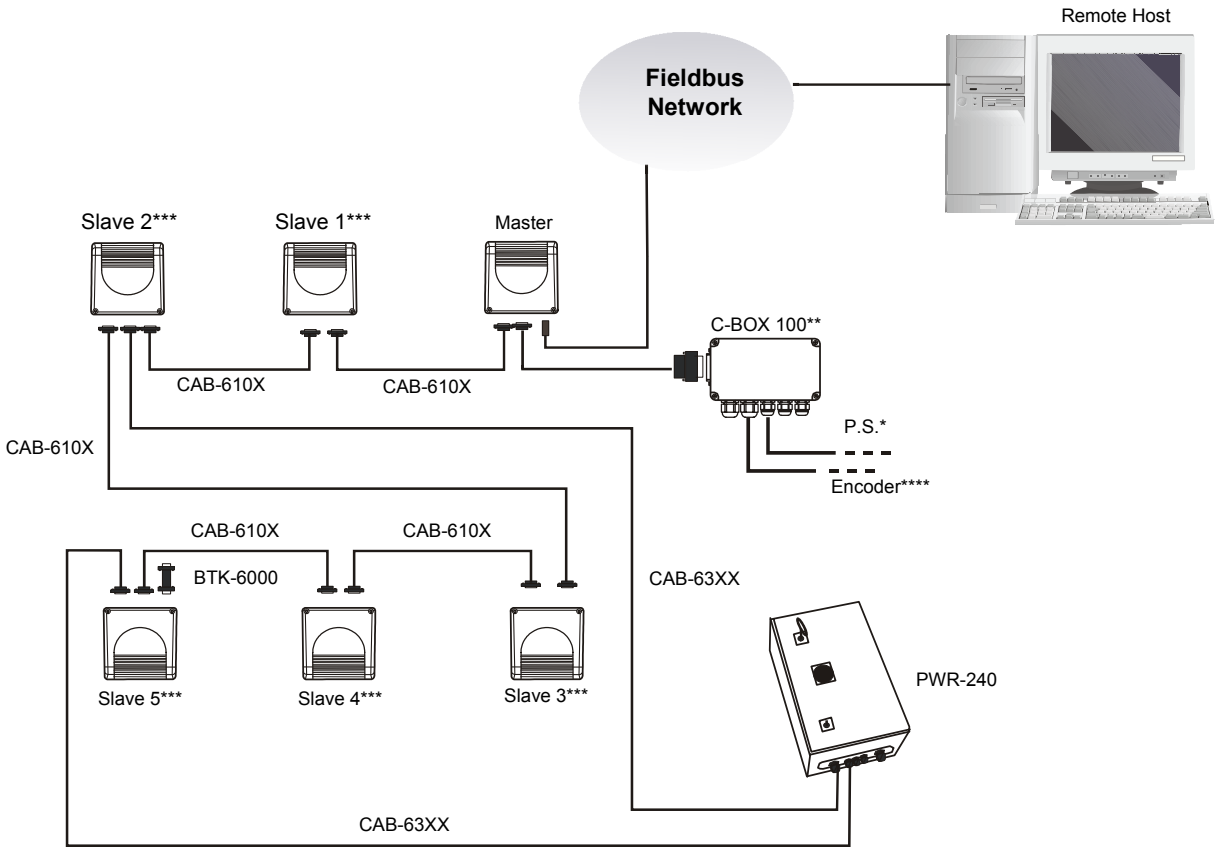
The external signals (trigger, encoder) are connected to the master through the C-BOX 100.

The master reader connects to the first slave reader of the system through the local Lonworks 9-pin female connector. Fieldbus models are provided with an internal Lonworks terminator.

The slave readers are connected together through the local Lonworks connectors. Only the 9-pin female connector of the last slave reader must be terminated by the BTK-6000 terminator.

The example below shows a system powered by the PWR-240 where multiple slaves are connected through CAB-63XX power cable. The master and all slaves are connected together through the CAB-610X cables.

The same network layouts are available as for the DS6500 standard model.



* P.S. (Presence Sensor) connected to External Trigger/PS input.

** C-BOX 100 modified to accept scanner power.

*** The Slave scanners are Master/Slave models, which allow Lonworks network propagation.

**** Encoder connected to IN2/ENC input.

Figure 60 – Fieldbus Single P.S.

2.8 KEYPAD AND DISPLAY

The DS6500 keypad allows entering a menu for selection of one of the following functions:

- Welcome: shows the current software release and operating mode;
- Autolearn: starts the procedure making it possible to obtain an automatic, accurate and fast configuration of DS6500 without the necessity of directly checking/modifying the relevant parameters;
- Internal Net: defines scanner function within the network (see below);
- Ethernet Mode: allows setting the scanner IP address to be used within the network;
- LCD Contrast: sets the LCD contrast;
- Bus: allows setting the scanner address (value range 0-125) to be used in a Profibus network;
- Test Mode: allows verifying the scanner reading position and features (see below).

The same settings may be performed by using the Genius™ program (see chapter 3 for details).

2.8.1 Internal Net

This submenu can be used as an alternative to configuration through Genius™, to assign the DS6500 scanner within a master/slave network.
It allows defining the scanner function (slave/master) within the network and, if configured as Slave, its address.
To enter the Internal Net submenu and configure the scanner follow the given procedure:

1) Press and hold both the ▲ (up arrow) and ▼ (down arrow) keys for about 2 seconds to enter the Main menu;
2) Use the ▲ (up arrow) or ▼ (down arrow) key to select the “Internal Net” item, then press the ENT (enter) key to confirm;
3) Use the ▲ (up arrow) or ▼ (down arrow) key to select the “LonWAddrSel”” item, then press the ENT (enter) key to confirm;
4) Use the ▲ (up arrow) or ▼ (down arrow) key to select your scanner function among “Master”, “Slave n”, “Slave jolly”, “Disabled”; then, press the ENT (enter) key to confirm;
5) Use the ▲ (up arrow) or ▼ (down arrow) key to select the “Exit” item, then press the ENT (enter) key to confirm. Repeat this step again to exit the Main Menu and return to the scanner current operating mode.

2.8.2 Test Mode

Test Mode is particularly advised during the installation phase, since it causes the reader to be continuously activated allowing to verify its reading features and its reading position with respect to the barcode.
To enter the Test Mode submenu and configure the scanner follow the given procedure:

1) Press and hold both the ▲ (up arrow) and ▼ (down arrow) keys for about 2 seconds to enter the Main menu.
2) Use the ▲ (up arrow) or ▼ (down arrow) key to select the “Test Mode” item, then press the ENT (enter) key to confirm. The reader enters Test Mode.
3) Press the ▲ (up arrow) key to exit the Test Mode.
4) Use the ▲ (up arrow) and ▼ (down arrow) key to select the “Exit” item, then press the ENT (enter) key to confirm. The scanner exits the Main Menu and returns to its current operating mode.

3 SOFTWARE CONFIGURATION

3.1 GENIUS™ INSTALLATION

Genius™ is a new Datalogic scanner configuration tool providing several important advantages:

- Wizard approach for low skilled users;
- Multi-language version;
- Defined configuration directly stored in the reader;
- Communication protocol independent from the physical interface allowing to consider the reader as a remote object to be configured and monitored.

To install Genius™, proceed as follows:

1) Turn on the PC that will be used for configuration, running either Windows 98, 2000/NT or XP;
2) Insert the Genius™ CD-ROM;
3) Wait for the CD autorunning and follow the installation procedure.

3.2 GUIDE TO RAPID CONFIGURATION

3.2.1 Wizard for Quick Reader Setup

After installing the Genius™ software program (see par. 3.1) the following window appears asking the user to choose the desired configuration level:

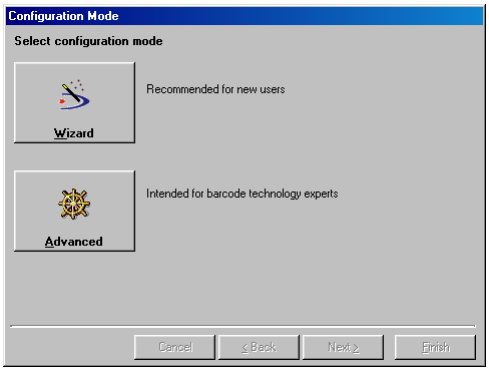


Figure 61 - Genius™ Wizard Opening Window

The Wizard option is advised to low skilled users, since it shows a step by step scanner configuration. The parameters to be defined are the following:

- Barcode selection and definition;
- Operating mode selection and definition;
- Digital Inputs/Outputs configuration;
- Hardware interface selection;
- Output data format configuration.

After defining the parameter values the following window appears allowing to complete the reader configuration as follows:

- Saving the configuration to disk;
- Switching to Advanced mode;
- Sending the configuration to the scanner.

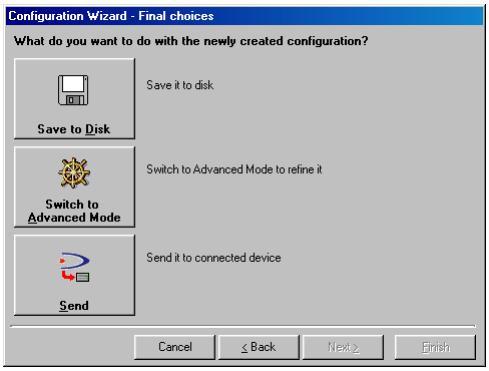

Configuration Wizard - Final choices
What do you want to do with the newly created configuration?
Save to Disk
Save it to disk
Switch to Advanced Mode
Switch to Advanced Mode to refine it
Send
Send it to connected device
Cancel
< Back
Next >
Finish

Figure 62 - Genius™ Wizard Closing Window

Test Operating Mode

NOTE

This operating mode is not available when DS6500 works as slave.

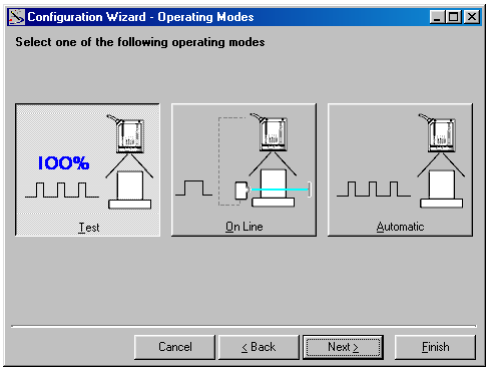


Figure 63 - Test Mode Selection

This operating mode causes the reader to be continuously activated allowing to verify its reading features and its reading position with respect to the barcode. For this reason, it is particularly advised during the installation phase of the reader.

After 100 scan, the values relative to an internal counter and the decoded code are displayed and transmitted on the serial interface. The counter reports the percentage of good reads of the label.

On Line Operating Mode

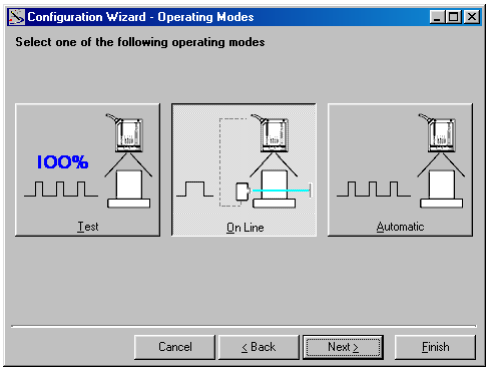


Figure 64 - On Line Mode Selection

This operating mode causes the reader to be connected to an external Presence Sensor using EXT TRIG/PS A and EXT TRIG/PS B inputs.
During the active phase of the presence sensor, the DS6500 reader tries to acquire and correctly decode the code.
In case the decoding phase is successful, the barcode characters are transmitted on the serial interface. Otherwise, a no read message is sent.

Automatic Operating Mode

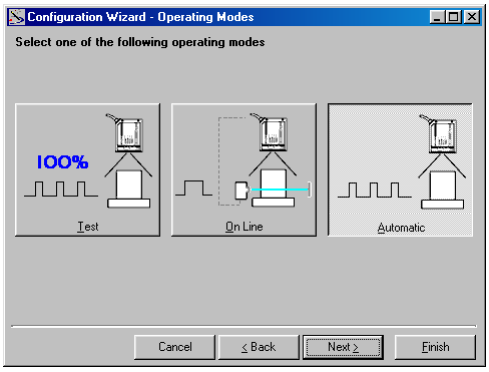


Figure 65 - Automatic Mode Selection

This operating mode does not require the connection to an external Presence Sensor.
When working in this mode the reader is continuously scanning, while the reading phase is activated each time a barcode enters the reader reading zone. The reader stops reading after an N number of scans without a code.
Barcode characters are transmitted on the serial interface. In case of a failed reading phase no message is sent to the host computer.

3.2.2 Genius™ Network Setup Through Master

The Network Setup allows configuring your Local Lonworks Network through the Master using Genius™.

Three different procedures are available to define the number of network slave scanners, their label and address according to two main conditions:

Condition	Available Procedure	Feature
Unknown Slave Addresses	Net-Autoset	automatically assigns random addresses to slave or Stand Alone scanners.
Known Slave Addresses	Network Wizard	customizes the network (slave label and address definition and physical identification of a specific slave within network), updates configuration to a file and makes it ready to be sent to the Master.
	Express Network Setup	automatically performs all the operations of the Network Wizard apart from the physical identification of a specific slave scanner.

NOTE

The Network Setup procedure as described requires Genius™ software version 1.06 or later. In addition, the Net-Autoset procedure requires scanner software version 6.40 or later.

1. **The first operation** to perform is the configuration of your **scanner as "Master"** from the Local Device Network Settings item in the Device Menu, see figure below:

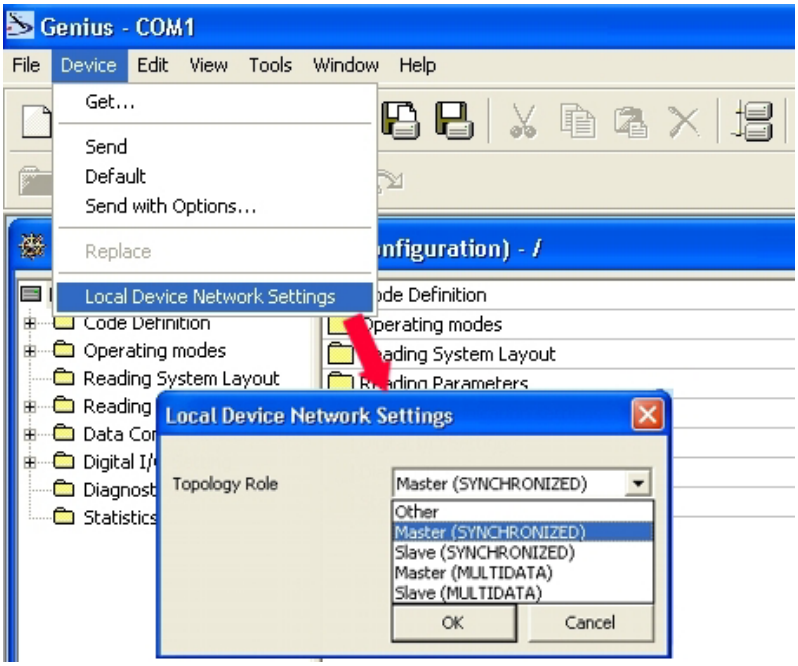
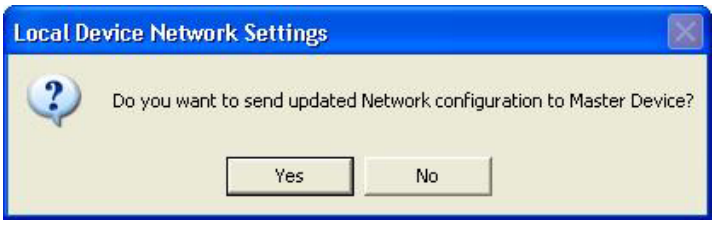


Figure 66 – Local Device Network Settings

The following dialog box appears asking whether to send the configuration to the Master or not:



2. Click the "Yes" button, then click on the icon available on the Toolbar to make the “Devices” area appear next to the Parameter Explorer window. By repeatedly clicking the icon this area will be displayed or hidden.

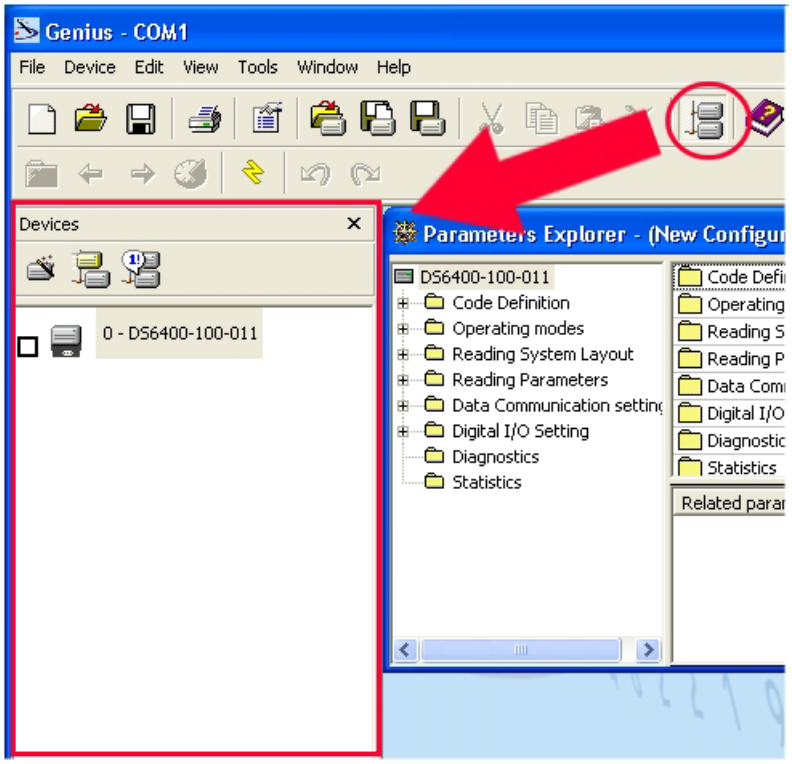


Figure 67 – Cluster Configuration

Each scanner of the cluster is indicated by the following graphical objects:

- check box allowing to select/deselect a specific scanner to perform the desired operations (i.e. program downloading);
- icon representing the scanner status;
- a label reporting information transmitted by the scanner when connected (the scanner address, generated errors, scanner description).

3. **Then, proceed with the network setup** by using one of the icons available on the Tool Bar according to the procedure to follow:

= Net-Autoset procedure

= Network Wizard procedure

= Express Network Setup procedure

Net-Autoset

This procedure is to be used when all scanner addresses and labels are unknown (typically when configuring the network for the first time or whenever a network reconfiguration is required).

By clicking the icon or selecting the "Net_Autoset" option from the right-click menu, the Net-Autoset procedure is started allowing automatic assignment of random addresses to all slave or Stand Alone scanners connected within the network.
Once the procedure has been completed, it is possible to:

- define customized addresses and labels through the Network Wizard;
- display the scanner default labels through the Express Network Setup.

Express Network Setup

Before performing this procedure, a Lonworks address must be assigned to each slave scanner. The most practical method is through the Net-Autoset procedure. See par. 3.2.3 for alternative address assignment methods.

Once all addresses have been assigned, the Express Network Setup is to be used when all scanner addresses and labels do not need to be modified.

By clicking on the icon or by choosing the related option from the right-click menu, the procedure is started which automatically performs the following operations:

- opening the wizard;
- polling the network to discover connected scanners;
- transferring all scanners found to the "Requested Devices" area of the wizard where your network customization is defined;
- saving the new network configuration;

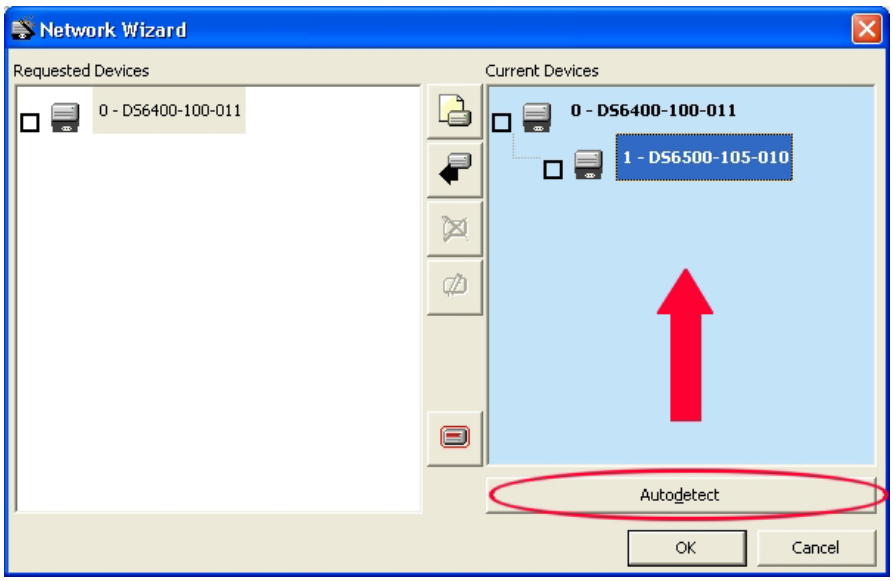
Once the procedure has been completed, a dialog box will appear asking whether to send the configuration to the Master. Choose the “Yes” option to start this procedure.

Network Wizard

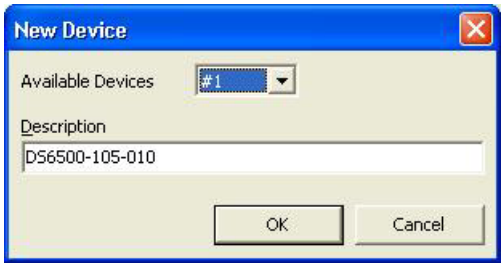
Before performing this procedure, a Lonworks address must be assigned to each slave scanner. The most practical method is through the Net-Autoset procedure. See par. 3.2.3 for alternative address assignment methods.

Once all addresses have been assigned, the Network Wizard is to be used when one or more scanner addresses and labels need to be modified.

1. Click on the button to open the Network Wizard dialog box:

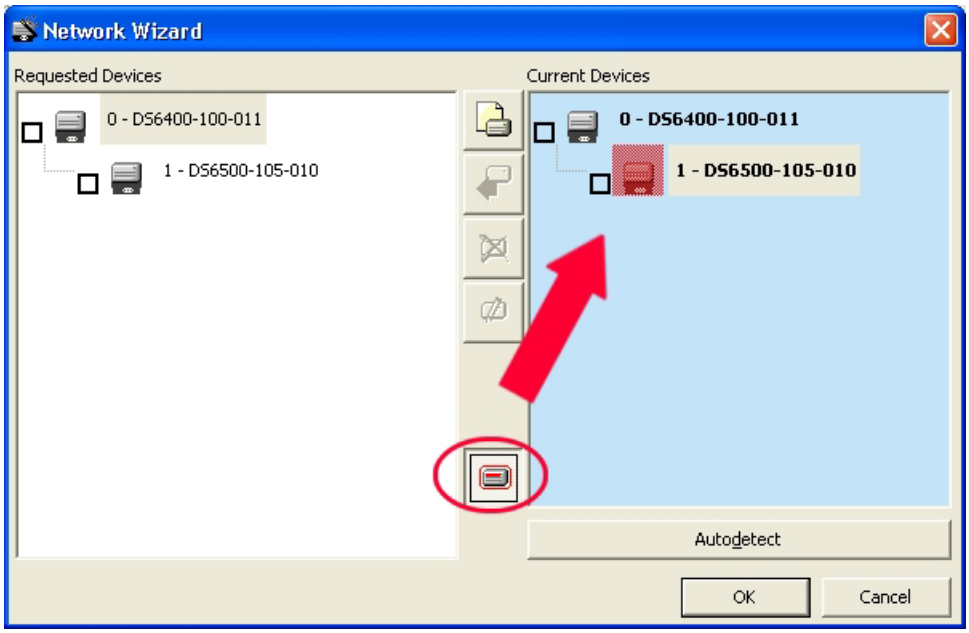


a. if the slave scanners have already been configured and wired to the network, click on the Autodetect button to start a polling procedure of the current network. All slave scanners found will be represented in the “Current Devices” area. Then, select the desired slave scanner from the “Current Devices” area and click on the icon (or drag and drop) to transfer it to the “Requested Devices” area where your network customization is defined. The following dialog box will appear allowing (if necessary) to change the slave address ("Available Device" field) and label ("Description" field):



b. if the slave scanners have not been configured and wired to the network, click on the icon to add a new device defining its address and model. The added slave scanner will be then displayed in the “Requested Devices” area. This option in any case requires that all slave scanners have their address set before the network can function.

2. If desired, select a slave scanner within the "Current Devices" area and click on the icon (or select the "Show Device" option from the right-click menu) to make the dialog box appear as follows:



The "Show Device" option is particularly useful after the Net-Autoset procedure or whenever it is necessary to know which address is assigned to a specific slave scanner. Indeed, it activates the following signals which physically indicate the scanner corresponding to the one selected, in particular:

- in Network Wizard the icon corresponding to the selected slave scanner starts blinking red;
- in the Physical Network all slave scanner lasers turn off except the one of the selected scanner which turns on.

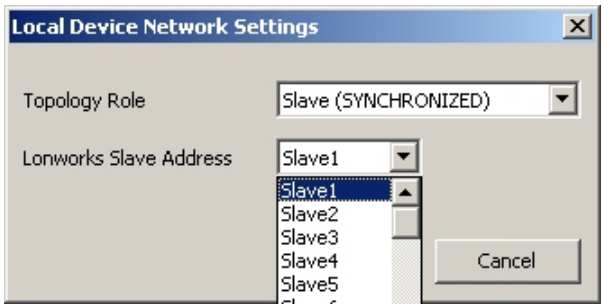
3. If desired, select the transferred/added slave scanner within the “Requested Devices” area and click on the icon to customize the scanner label and address.

4. Once your network has been customized, close the network wizard. Before closure, the program will show a dialog box asking whether to send the new configuration to the Master. Choose the “Yes” option to start this procedure.

3.2.3 Alternative Slave Address Assignment

As alternatives to Network Setup through the Master, each Slave scanner can be assigned an address through the following methods:

- address setting through the Local Device Network Settings item in the Device Menu with the slave scanner connected to Genius™



- manual address setting through slave scanner keyboard (see par. 2.8.1 for details).

3.3 ADVANCED GENIUS™ CONFIGURATION

The ADVANCED selection available when starting the Genius™ program is addressed to expert users being able to complete a detailed scanner configuration. By choosing this option it is possible either to start a new scanner configuration or to open and modify an old one. The desired parameters can be defined in the following window, similar to the MS Explorer:

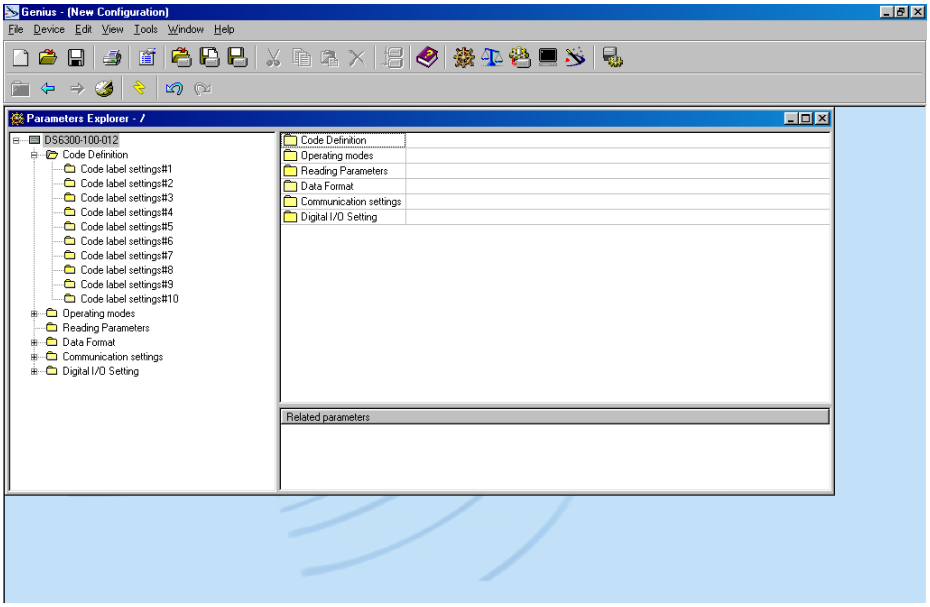


Figure 68 - Genius™ Parameter Explorer Window

The procedure for setting the scanner parameters is supported by a help on-line, which is displayed in an HTML browser. It can be selected from the Configuration Help option available in the Help menu. In addition, a context-sensitive help can be enabled by pressing the <F1> key after selecting the desired parameter.

3.4 PARAMETER DEFAULT VALUES

The following table contains the list of the factory default settings for the DS6500.
Genius™ also allows checking the parameter default values by selecting the "Compare parameters" option available in the Tools menu and comparing the current scanner configuration to the default one.

Parameter	Default Setting
Code Definition	
Code Combination	Single Label
No read Message	Global No Read Message
No Read String	<CAN>
Multiple Read Filters	Disabled (unchecked)
Code Label Settings #1	
Code Symbology	Interleaved 2 of 5
Label Length	8
Min Code Position	0
Max Code Position	255
Check Digit	Disabled (unchecked)
Decoding Safety	1
Decoding Severity	3
Match String Rule	Match
Pattern Match String	Empty
Match Direction Rule	Disable
Code Label Settings #2	
Code Symbology	Code 39
Label Length	Variable
Minimum Label Length	1
Maximum Label Length	60
Min Code Position	0
Max Code Position	255
Check Digit	Disabled (unchecked)
Decoding Safety	1
Decoding Severity	3
Match String Rule	Match
Pattern Match String	Empty
Match Direction Rule	Disable
Operating Modes	
Operating Mode Selection	On Line
On Line Options	On Line 1 Input
Start Input Number	1
Start Input Active Level	Active Closed
Reading Phase Timeout	Disabled (unchecked)
Verifier	Disabled (unchecked)
Reading System Layout	
Device Assignment	Alone

Parameter	Default Setting
Reading System Layout	
Modify&Backup Lon Slave Configuration	Disabled (unchecked)
Enable A.S.R.	Disabled (unchecked)
Reading Parameters	
Beam Shutter	Disabled
Overflow Start Ratio	5
Overflow Stop Ratio	5
Reading Mode	Reconstruction
Reading Condition	Standard
Reconstruction Parameters	
Enabled Stacked Code	Disabled (unchecked)
Extended	
Min Match	0
Position Tolerance	50
Duration Tolerance	50
Min Start/Stop Number	2
Inter Char Gap	8
Addon Overflow Ratio	2
Scan Line Amplitude	
Amplitude Settings Enable	Disabled (unchecked)
Data Communication Settings	
Host Application Protocol Type	Standard
Data Format	
Header TX Start	With data
Termination After No Read Message	Enabled (checked)
Message Tx Trigger Selection	On Decoding
Format Type	Standard
Tx Max Delay After Phase Off	Disabled
Code Identifier	Disabled
Parameters	
Header String	<STX>
Code Position	Disabled (unchecked)
Code Direction Identifier Enable	Disabled (unchecked)
Termination String	<CR><LF>
Data Packet Separators	<CR><LF>
Code Field Length Setting	Variable Length
Main Serial Port	
Data Tx	Enabled (checked)
Heartbeat	Disable
Parameters	
Main Port Communication Mode	Standard
Main Port Electrical Interface	RS232
Handshake	None
Baud Rate	9600
Parity	None
Data Bits	8

Parameter	Default Setting
Main Serial Port	
Parameters	
Stop Bits	1
Auxiliary Serial Port	
Data Tx	Enabled (checked)
Heartbeat	Disable
Pass Through	Disabled (unchecked)
Parameters	
Baud Rate	115200
Parity	None
Data Bits	8
Stop Bits	1
Digital I/O Setting	
Digital Input Lines Setting	
Debouncing For Input 1, 3 and 4	5ms
Debouncing For Input 2	500 µs
Input 1 Active Level Overridden by Op. Mode	Active Closed
Input 2 Active Level Overridden by Op. Mode	Active Closed
Input 3 Active Level Overridden by Op. Mode	Active Closed
Input 4 Active Level Overridden by Op. Mode	Active Closed
Output 1	
Line State	Normally Open
Activation Event	Complete Read
Alternative Activation Event	Wrong
Deactivation Event	Timeout
Alternative Deactivation Event	None
Deactivation Timeout (ms)	50
Output 2	
Line State	Normally Open
Activation Event	No Read
Alternative Activation Event	Partial Read
Deactivation Event	Timeout
Alternative Deactivation Event	None
Deactivation Timeout (ms)	50
Output 3	
Line State	Normally Open
Activation Event	None
Alternative Activation Event	None
Deactivation Event	None
Alternative Deactivation Event	None
System Information Section	
User Information Section	
End User Name	Empty
Device Name	Empty
Line Name	Empty

Parameter	Default Setting
Diagnostics	
PackTrack Debug Message Tx Enable	Disabled (unchecked) Unchecked
Statistics	Disabled (unchecked)

4 READING FEATURES

4.1 ADVANCED CODE RECONSTRUCTION (ACR™ 4)

The traditional way of barcode reading could be called “Linear Reading”. In this case, the laser beam crosses the barcode symbol from its beginning to its end as shown in the following figure:

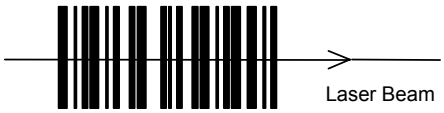


Figure 69 – Linear Reading

In Advanced Code Reconstruction mode it is no longer necessary for the laser beam to cross the label from the start to the end. With just a set of partial scans on the label (obtained using the motion of the label itself), the DS6500 is able to “reconstruct” the barcode. A typical set of partial scans is shown in the figure below:

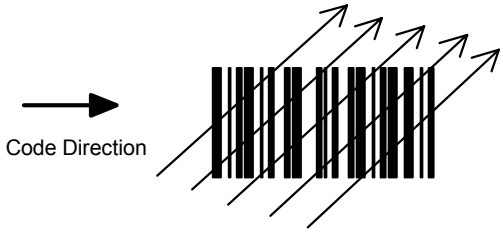


Figure 70 – Partial Scans

None of the partial scans contains the whole label. The decoder aligns each partial scan correctly and combines them in order to obtain the entire code.

The alignment is performed by calculating the time difference from one partial scan to another using a reference code element.

4.1.1 Tilt Angle for Advanced Code Reconstruction

The most important parameter in Advanced Code Reconstruction is the value of the maximum tilt angle (α maximum) under which the code reconstruction process is still possible.

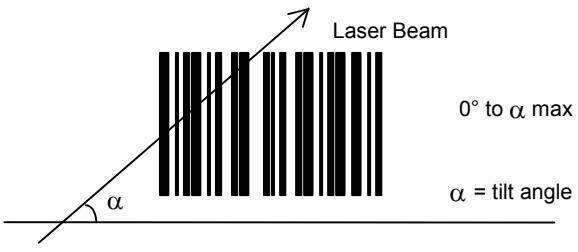


Figure 71 – Tilt Angle

The decoder will be able to read the label with a tilt angle between + α max and - α max as shown in the following figure:

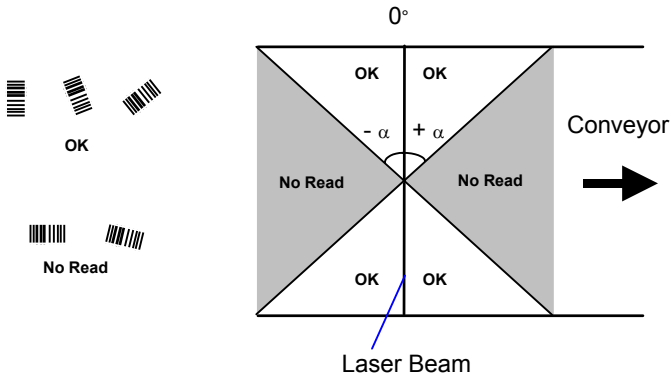


Figure 72 – Reading Zones with α Max

4.2 ASTRA™

Automatically SwiTched Reading Area™ is the Datalogic technology based on a multi-laser architecture and a fixed mounted optic system which concentrates the multiple laser emissions in a single laser beam. As each laser emitter is focused on a specific range of the reading area, a sophisticated electronic controller selects the best focused laser emitter with respect to the code read. Since there is no mechanical movement but electronic device switching, the laser selection is extremely fast (few tens of nanoseconds). This allows the reading of medium-high density codes in a large reading area on very fast conveyors.

The DS6500 scanner is based on a dual laser optic platform and ASTRA™ technology inherited from the DS8100 scanner. This technology is based on the capability of the barcode reader to measure the distance from the scanned object. According to the value of this distance signal, the reader decides which laser is supposed to be turned on. As a result, the total depth of field (DOF) of the reader is increased without any moving part involved: this means higher reliability and extremely low reaction time.

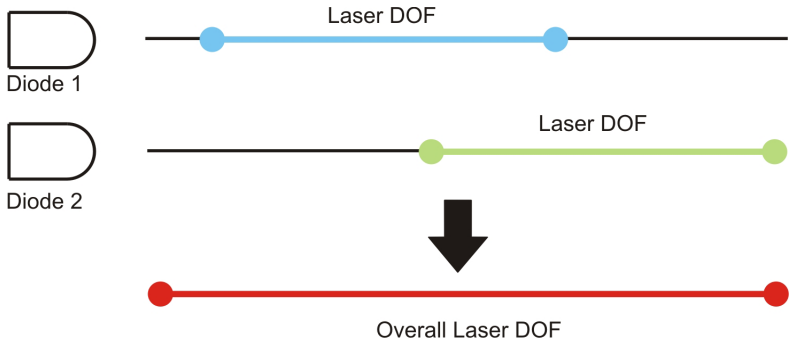


Figure 73 – ASTRA™

The figure above gives a graphical representation of the ASTRA™ functionality, where the real time switching between the two laser diodes increases the overall depth of field, that is the sum of each individual laser depth of field.
The ASTRA™ functionality has been designed for applications when an extended real time DOF is requested, like reading parcels on fast moving conveyors. This is the typical situation in the Transportation & Logistics industry, when the sortation of huge quantities of parcels is solved by means of barcode readers.

4.3 PACKTRACK™

PackTrack™ is a patented operating mode for Datalogic Omni-Directional Reading Stations used to read and correctly assign codes read on different packs when placed in the scanner Reading Area at the same time.

In fact, in the following example, the codes of two or more consecutive packs are found at the same time in the scanner reading area. Therefore, the condition occurs where, in the sequence of the two packs, the code of the second pack is read first, just before the code of the previous pack. A system without PackTrack™ would assign the code of the second pack to first pack and vice versa, thus causing a gross error in sortation.

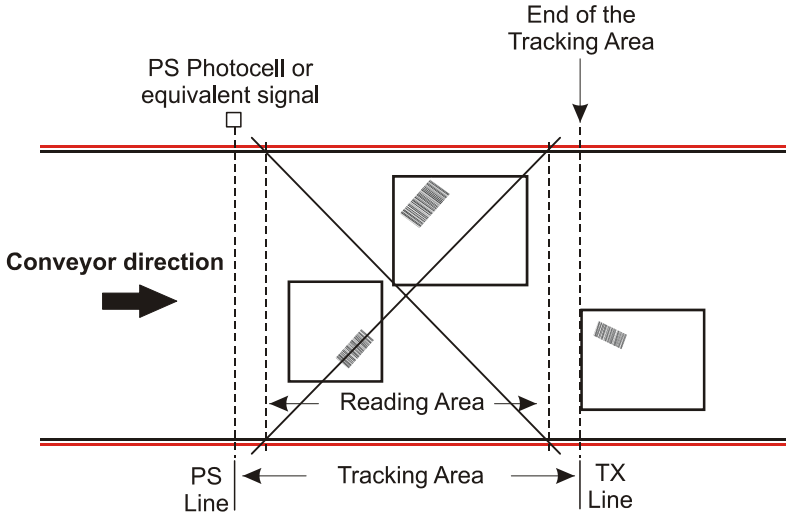


Figure 74 – PackTrack™ System Layout

Working in PackTrack™ mode requires the presence of an encoder and a presence sensor to track the moving packs.

All PackTrack™ functionalities are programmed via the Genius™ tool (refer to the Genius™ Help On-Line for details).

For correct functioning, the PackTrack™ operating mode requires a calibration just after the installation of the scanners. This operation is absolutely necessary to make the scanner recognize its position in space. Thus, a fixed reference system is required.

PackTrack™ uses a right-handed reference system (right hand with thumb = X axis; forefinger = Y axis; middle finger = Z axis) where the axis X coincides with the PS line, the Y axis coincides with the conveyor direction and the Z axis is oriented upwards from the conveyor (see figure below).

This coordinate system is absolute for the reading station, i.e. is valid for all the scanners independently from their position or orientation with respect to the conveyor.

Three barcodes are placed along the scanline. For each of them, three coordinates are shown.

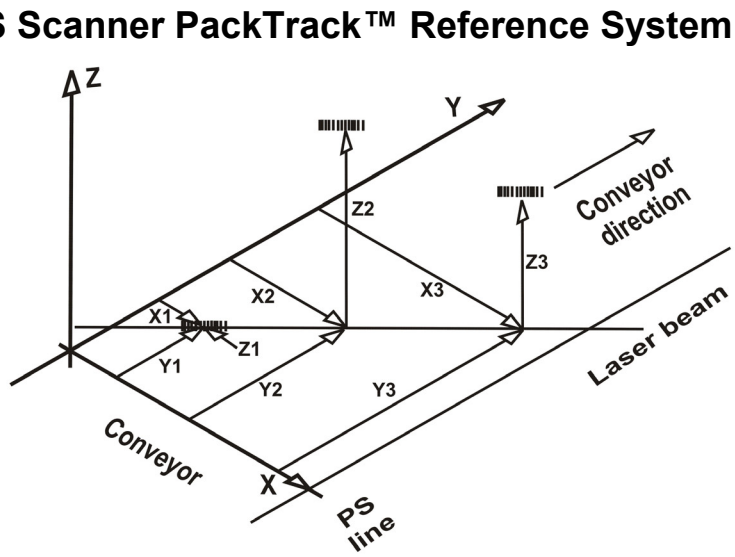


Figure 75 - DS Scanner PackTrack™ Reference System

4.3.1 PackTrack™ Calibration for DS6500

By means of the Genius™ software tool SPY, the user can perform PackTrack™ calibration. Select the “SPY” option from the Tools menu or click on the related icon on the Genius™ toolbar to open the following dialog box:

Note: When selecting a slave scanner through the Master, click on the slave to calibrate in the Devices window, then click the SPY icon.

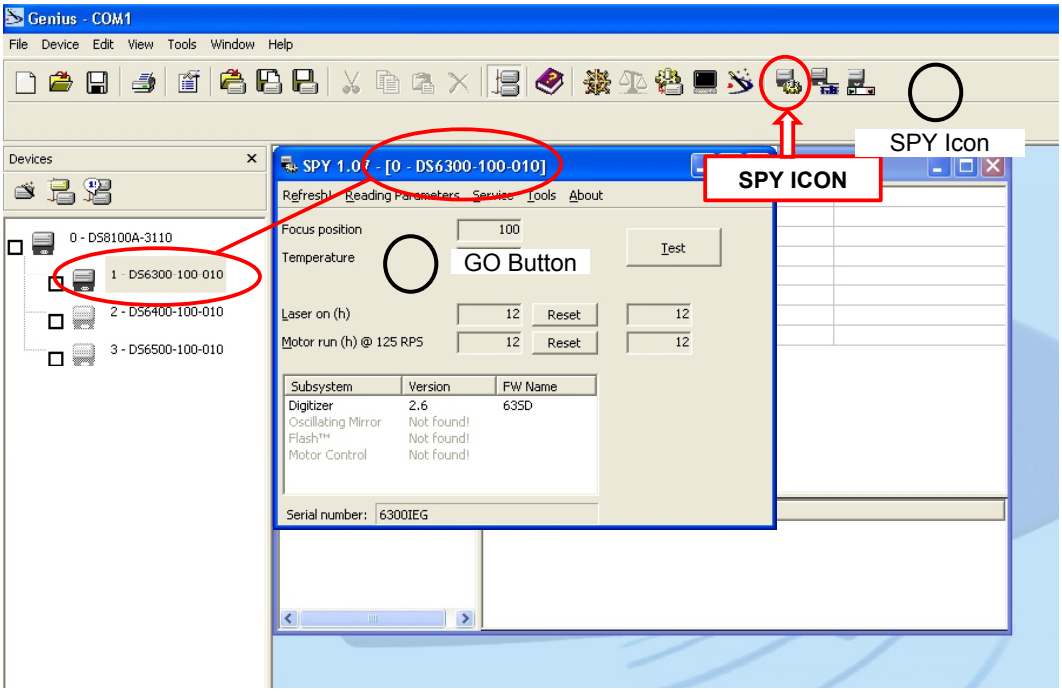


Figure 76 – Opening the Spy Window

Once the Spy window has been opened, select the “PackTrack Calibration” option from the Tools menu:

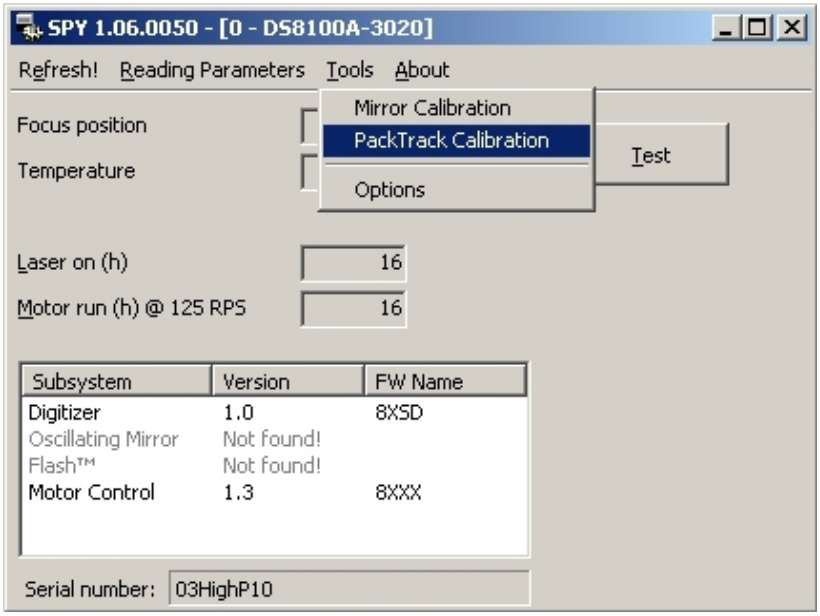


Figure 77 – Selecting PackTrack™ Calibration

By selecting the “PackTrack Calibration” option a further dialog box appears allowing to start calibration:

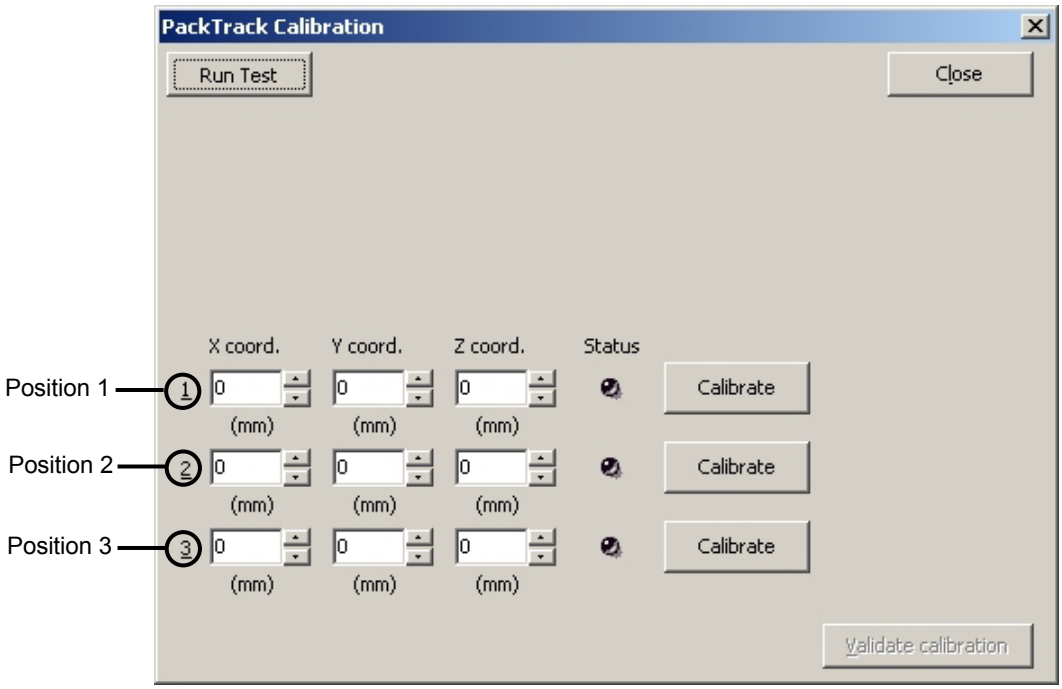


Figure 78 – Performing the PackTrack™ Calibration

1. Place the code at the desired position on the scan line (i.e. Position 1)
2. Measure the X, Y and Z coordinates relative to the center of the code and enter them into the corresponding edit boxes.
3. Press the Calibrate button for Position 1 to start the calibration.
4. Repeat the same procedure for Position 2 and Position 3.
5. Press the “Validate Calibration” button to validate the calibration settings.

Before closing the dialog box, press the Run Test button to test the calibration results and efficiency.

NOTE

In the vast majority of systems the x and z data are not necessary. For these cases set x = 0, z= 0 during the calibration procedure.

4.3.2 PackTrack™ Calibration for DS6500 Oscillating Mirror Models

The DS6500 oscillating mirror models can be used in PackTrack™ operating mode only when the scanner is mounted so that the scan line is parallel to the conveyor direction as shown in the following figure:

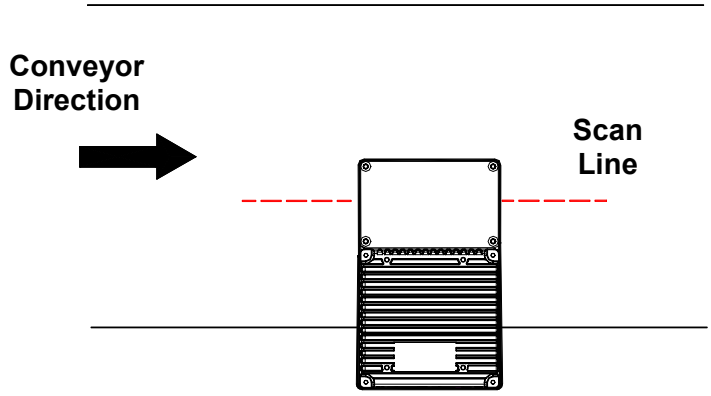


Figure 79 – Oscillating Mirror Models in PackTrack™ Mode

PackTrack™ Calibration must be made while the scanning plane is perpendicular to the conveyor plane and fixed (not oscillating).

4.4 PERFORMANCE

The scan rate is 800 scans/sec.

Refer to the diagrams in par. 4.5 for further details on the reading features. These diagrams are taken on various resolution sample codes at a 25 °C ambient temperature depending on the conditions listed under each diagram.

4.4.1 Reading Conditions

- ANSI Grade B minimum
- 800 scans/sec

The following tables describe the requirements for standard applications.

		Minimum Code Height for ACR Reading (mm)											
		45°						30°					
Conveyor Speed (m/s)		0.5	1	1.5	2	2.5	3	0.5	1	1.5	2	2.5	3
2/5 Interleaved Code Resolution (mm)	0.25	10	12	14	16	18	20	7	9	10	12	13	15
	0.30	12	14	15	17	19	21	8	9	11	12	14	15
	0.33	13	14	16	18	20	22	8	10	11	13	14	16
	0.38	14	16	18	19	21	23	9	11	12	14	15	17
	0.50	18	19	21	23	25	26	11	12	14	15	17	18
	0.72	24	25	27	28	30	32	15	16	17	19	20	22
	1.00	33	34	35	36	38	40	20	21	22	23	25	26

Ratio 3:1

Table 1

		Minimum Code Height for ACR Reading (mm)											
		45°						30°					
Conveyor Speed (m/s)		0.5	1	1.5	2	2.5	3	0.5	1	1.5	2	2.5	3
Code 39 Code Resolution (mm)	0.25	9	10	12	14	16	17	6	7	9	10	12	13
	0.30	10	11	13	15	17	18	7	8	9	11	12	14
	0.33	11	12	13	15	17	19	7	8	10	11	13	14
	0.38	12	13	14	16	18	20	8	9	10	12	13	15
	0.50	15	16	17	18	20	22	10	10	11	13	14	16
	0.72	20	21	22	23	24	26	13	13	14	15	17	18
	1.00	27	28	29	30	31	32	17	17	18	19	20	21

Ratio 3:1; Interdigit = Module Size

Table 2

		Minimum Code Height for ACR Reading (mm)											
		45°						30°					
Conveyor Speed (m/s)		0.5	1	1.5	2	2.5	3	0.5	1	1.5	2	2.5	3
Code 128 – Ean 128 Code Resolution (mm)	0.25	8	9	11	13	15	17	5	7	8	10	11	13
	0.30	8	10	12	14	16	18	6	7	9	10	12	13
	0.33	9	11	13	14	16	18	6	8	9	11	12	14
	0.38	10	11	13	15	17	19	7	8	10	11	13	14
	0.50	12	13	15	17	19	21	8	9	11	12	14	15
	0.72	16	17	19	21	22	24	10	11	13	14	16	17
	1.00	22	23	24	25	27	29	13	14	15	17	18	20

Table 3

		Minimum Code Height for ACR Reading (mm)											
		45°						30°					
Conveyor Speed (m/s)		0.5	1	1.5	2	2.5	3	0.5	1	1.5	2	2.5	3
Codabar Code Resolution (mm)	0.25	8	9	11	13	15	17	5	7	8	10	11	13
	0.30	9	10	12	14	16	18	6	7	9	10	12	13
	0.33	9	11	13	14	16	18	6	8	9	11	12	14
	0.38	10	11	13	15	17	19	7	8	10	11	13	14
	0.50	13	14	15	17	19	21	8	9	11	12	14	15
	0.72	17	18	19	21	22	24	11	12	13	14	16	17
	1.00	23	24	25	26	27	29	14	15	16	17	18	20

Ratio 3:1; Interdigit = Module Size

Table 4

		Minimum Code Height for ACR Reading (mm)											
		45°						30°					
Conveyor Speed (m/s)		0.5	1	1.5	2	2.5	3	0.5	1	1.5	2	2.5	3
EAN 8-13, UPC-A Code Resolution (mm)	0.25	7	9	10	12	14	16	5	6	8	9	11	12
	0.30	8	9	11	13	15	17	6	7	8	10	11	13
	0.33	9	10	11	13	15	17	6	7	9	10	12	13
	0.38	10	11	12	14	16	18	7	7	9	10	12	13
	0.50	12	13	14	15	17	19	8	9	10	11	13	14
	0.72	16	17	18	19	20	22	10	11	12	13	14	16
	1.00	22	23	24	24	25	26	13	14	15	16	16	18

Table 5

4.5 READING DIAGRAMS

4.5.1 DS6500 Standard Model

DS6500-100-0XX

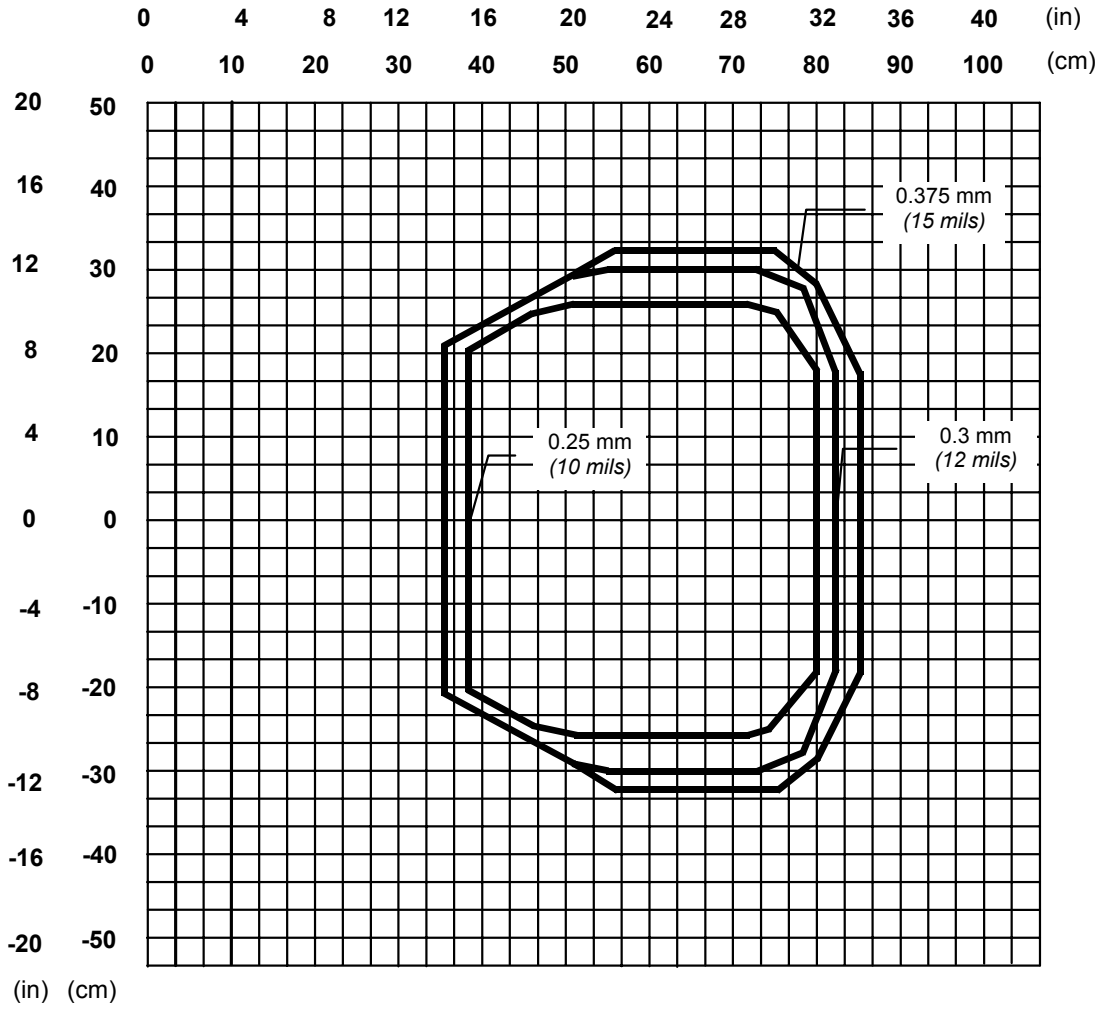


Figure 80 – DS6500-100-0XX Model Reading Diagram

Note: (0,0) is the center of the laser beam output window.

CONDITIONS

Code = Interleaved 2/5 or Code 39
PCS = 0.90
Pitch angle = 0°
Skew angle = 10° - 20°
Tilt angle = 0°

DS6500-200-0XX

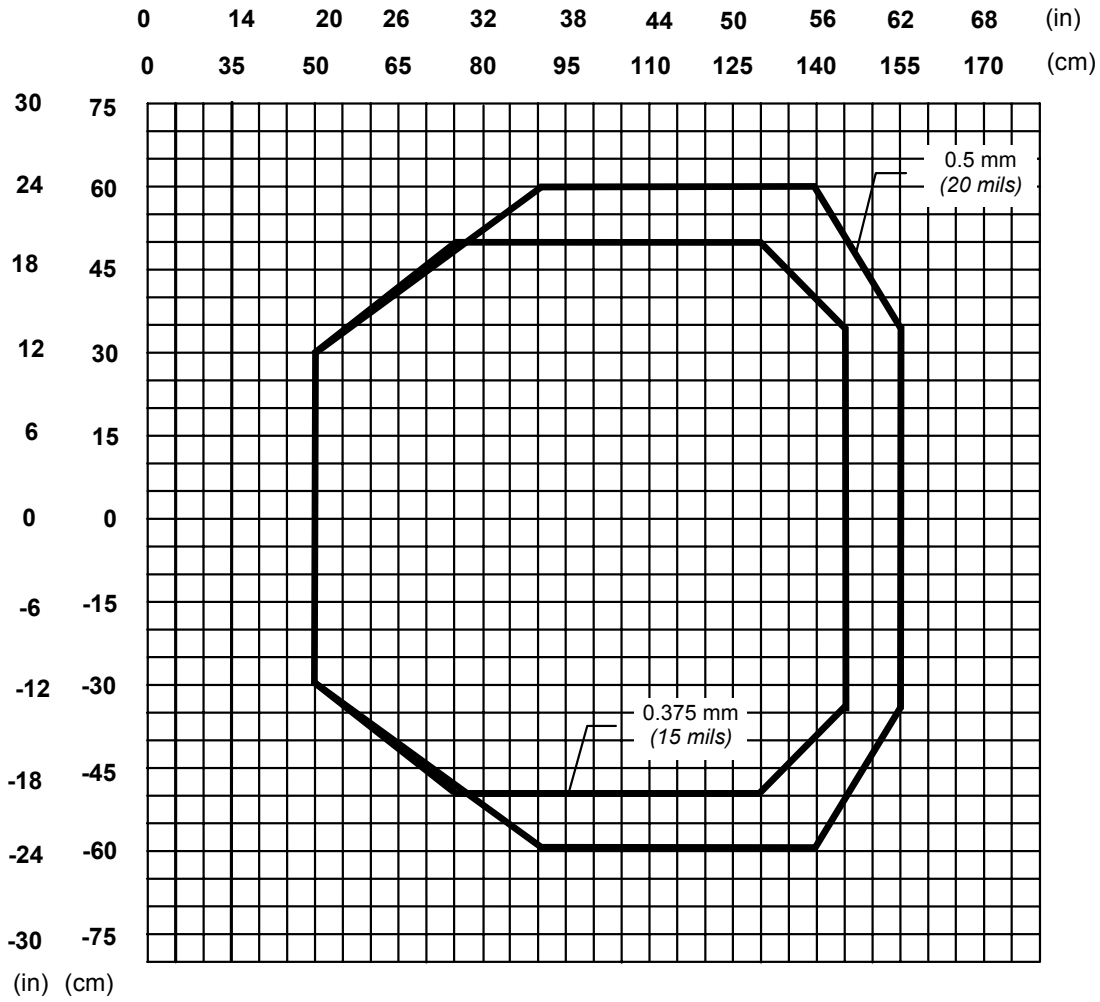


Figure 81 – DS6500-200-0XX Model Reading Diagram

Note: (0,0) is the center of the laser beam output window.

CONDITIONS

Code = Interleaved 2/5 or Code 39
PCS = 0.90
Pitch angle = 0°
Skew angle = 10° - 20°
Tilt angle = 0°

4.5.2 DS6500 Oscillating Mirror Model

DS6500-105-0XX

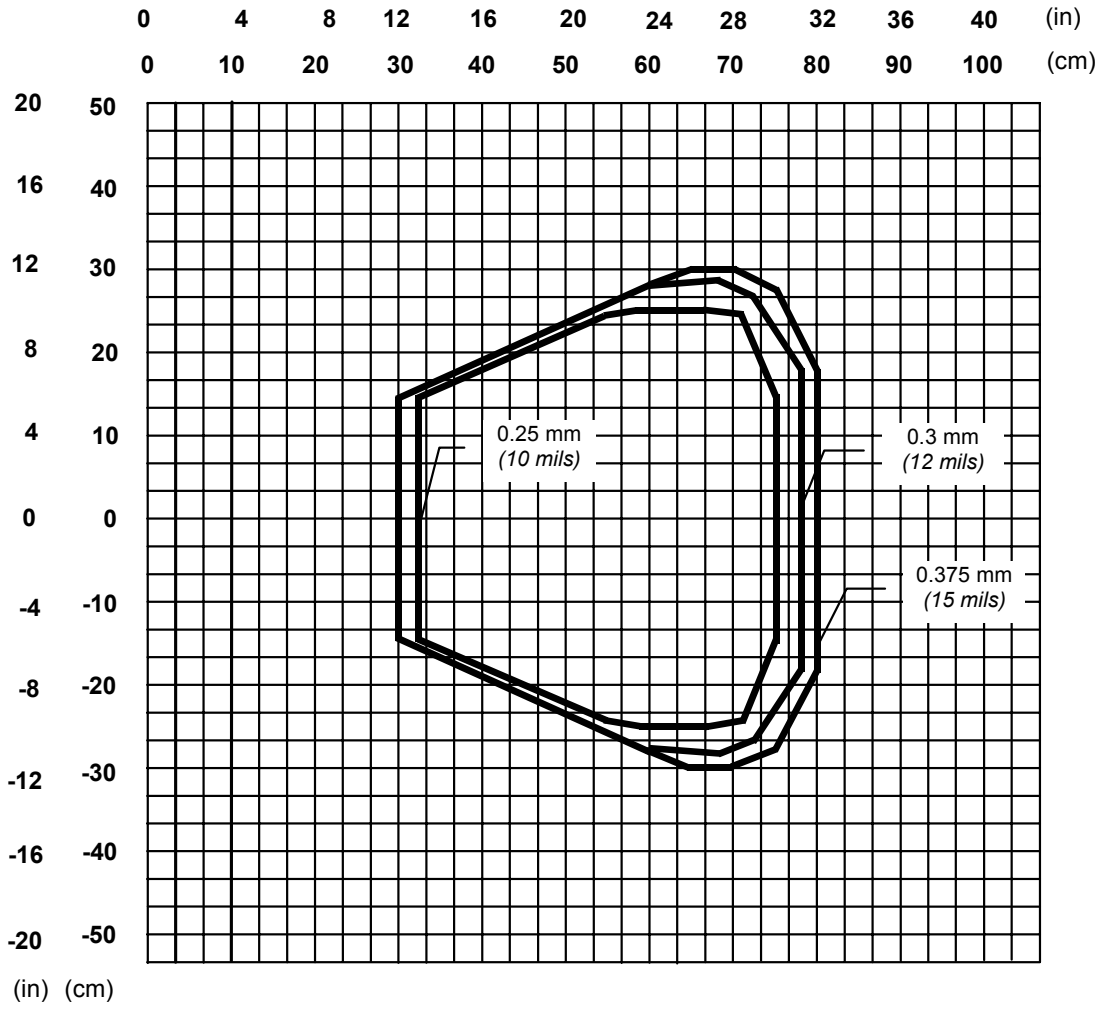


Figure 82 – DS6500-105-0XX Model Reading Diagram

Note: (0,0) is the center of the laser beam output window.

CONDITIONS

Code = Interleaved 2/5 or Code 39
PCS = 0.90
Pitch angle = 0°
Skew angle = 10° - 20°
Tilt angle = 0°

DS6500-205-0XX

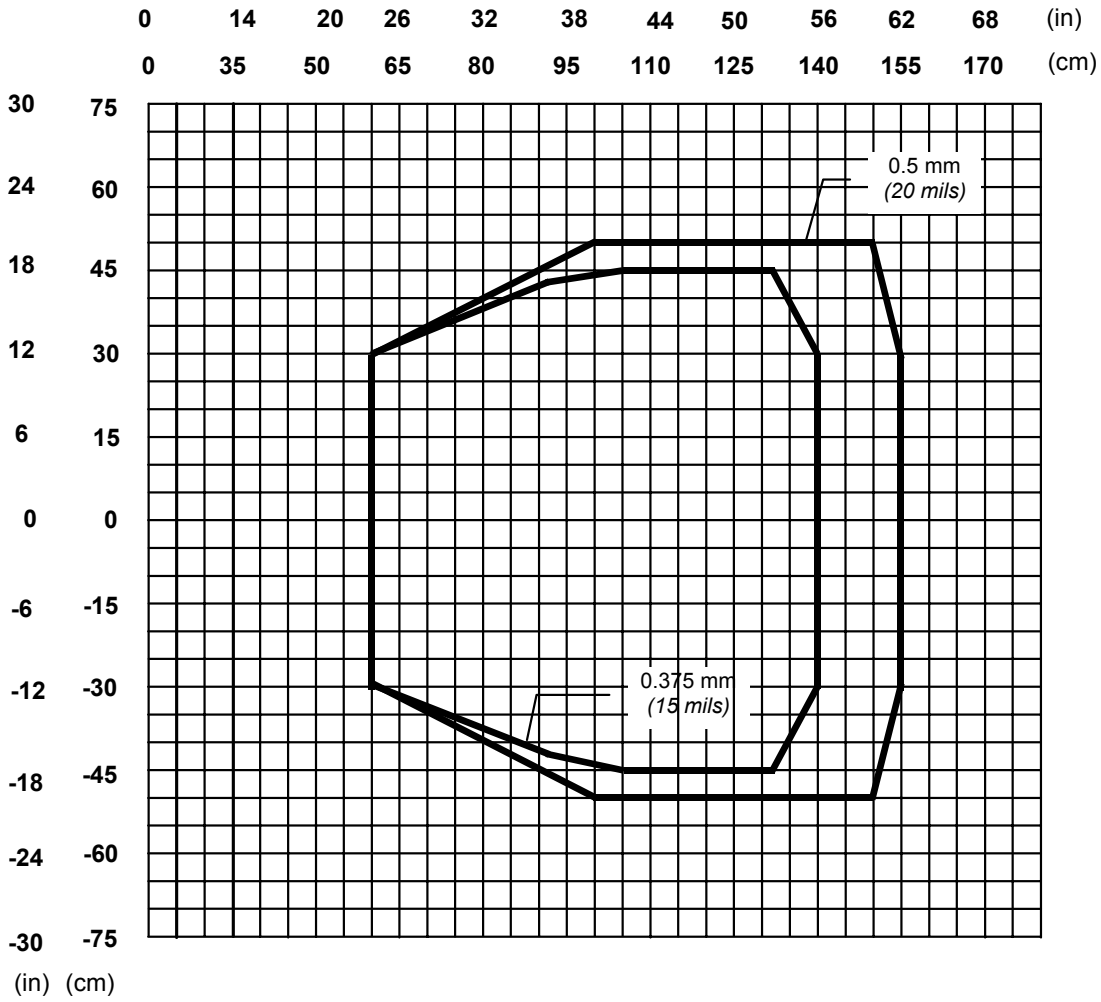


Figure 83 – DS6500-205-0XX Model Reading Diagram

Note: (0,0) is the center of the laser beam output window.

CONDITIONS

Code = Interleaved 2/5 or Code 39
PCS = 0.90
Pitch angle = 0°
Skew angle = 10° - 20°
Tilt angle = 0°

5 MAINTENANCE

5.1 CLEANING

Clean the laser beam output window (Figure A, 7) periodically for correct operation of the scanner.

Dust, dirt, etc. on the window may alter the reading performance.

Repeat the operation frequently in particularly dirty environments.

Use soft material and alcohol to clean the window and avoid any abrasive substances.

WARNING

Clean the window of the DS6500 when the scanner is turned off or at least when the laser beam is not active.

5.2 AUTOMATIC SCANNER REPLACEMENT (ASR)

The Datalogic Automatic Scanner Replacement (ASR) procedure allows restoring system functioning automatically after one or more scanners are replaced in a Master/Slave Lonworks network.

The ASR procedure is principally used for PackTrack™ configurations, since it restores the PackTrack™ calibration from the slave scanner to be substituted to the new scanner.

The Master must be prepared at the time of installation in order for this procedure to work correctly.

5.2.1 ASR Network Configuration

1. On the Master scanner, **check the Modify & Backup Lon Slave Scanner Configuration parameter** in Genius™ and configure the Lonworks Slave Scanner Common Parameters (Code and Reconstruction Parameters).

2. Enable the ASR procedure through the **Enable A.S.R. parameter** in the Master configuration.

3. Send the configuration to the Master EEPROM to force the Slave Operating Mode, Code Reading Symbologies, Reconstruction parameters and store all the Slave PackTrack™ calibration tables.

   Now the Slave scanners are configured through the Master and the ASR procedure is implemented.

4. Save this configuration to file (.ddc).

5.2.2 Scanner Replacement Procedure

NOTE

The ASR procedure requires replacing one scanner at a time.

Slave

1. Power down the entire system.
2. Replace the Slave scanner with a new one (default settings).
3. Power up the system and wait for initialization.

Master

1. Load the saved configuration from file (.ddc) to the new Master.
2. Power down the entire system.
3. Replace the Master scanner with the new one.
4. Power up the system and wait for initialization.

NOTE

The ASR works only if both the Master and Slave devices have software 6.40 or later.

6 TROUBLESHOOTING

NOTE

*Before contacting your local Datalogic office or Datalogic Partner or ARC, it is suggested to save the device configuration to a *.ddc file by means of the Genius™ software configuration program and check the device exact model and serial number.*

TROUBLESHOOTING GUIDE	
Problem	**Suggestion**
Power On: the “Power On” LED is not lit.	• Is power connected? • If using a power adapter (like PG6000), is it connected to AC source? • If using rail power, does rail have power? • If using C-BOX 100, does it have power (check switch and LED)? Check if you are referring to the 25/26-pin connector or to the C-BOX 100 spring clamp connectors. • Measure voltage either at pin 13 and pin 25 (for 25/26-pin connector) or at spring clamp 1 and (for C-BOX 100).
On Line Mode: the Master’s “Phase On” LED is not lit (when external trigger activates).	• Check carefully if you are referring to the 25/26-pin connector or to the C-BOX 100 spring clamp connectors. • Is sensor connected to EXT TRIG/PS input? • Is power supplied to photo sensor? • Is power supplied to one out of the two EXT TRIG/PS (NPN output)? • Is one out of the two EXT TRIG/PS grounded (PNP output)? • Are the photo sensor LEDs (if any) working correctly? • Is the sensor/reflector system aligned (if present)?
On Line Mode: the Master’s “Phase On” LED is correctly lit but nothing happens (no reading results).	• Is the software configuration consistent with the application condition (operating mode, etc..)? In the Genius™ software configuration program select the OPERATING MODES folder and check for related parameters.
Serial On Line Mode: the reader is not triggered (no reading results).	• In the Genius™ program select the OPERATING MODE folder and check if serial on line is enabled as “On Line options” parameter value. • Are the Start-Stop string correctly assigned? • Is the serial trigger source correctly connected and configured)

TROUBLESHOOTING GUIDE	
Problem	**Suggestion**
On Line Mode and Serial On Line Mode: the reader does not respond correctly to the expected external signal end.	• In the Genius™ software configuration program select the OPERATING MODES folder and check the "Reading Phase Timeout" parameterization.

Reading:
it is not possible to read the target barcode (always returns No Read)
	• Check synchronization of reading pulse with object to read.
	• Is the scan line correctly positioned?
	• Place barcode in the center of scan line and run TEST MODE (selectable by Genius™ as Operating Modes).
	If you still have troubles, check the following:
	  • Is the reading distance within that allowed (see reading diagrams)?
	  • Is the Tilt angle too big?
	  • Is the Skew angle less than 10° (direct reflection)?
	  • Choose the CODE tab and enable different code types (except Pharmacode). LENGTH = Variable.
	  • Is the barcode quality sufficient?
	• If you had no success, try to perform the test using the BARCODE TEST CHART included with the product.

Communication: the device is not transmitting anything to the host.	• Is serial cable connected? • Is correct wiring respected? • If using MAIN RS232 or RS485 interface, is the reference ground connected to proper SGND Main Isolated (also referred to as GND_ISO)? Be careful that it is not completely different from GND power ground. • If using C-BOX 100, be sure the RS485 termination switch is positioned to OFF. • Are serial host settings equivalent to serial device setting?
Communication: data do not appear on the terminal.	• In the Genius™ program enable the DATA COMMUNICATION SETTINGS/MAIN-AUXILIARY PORT\DATA TX parameter.
Communication: data transferred to the host are incorrect, corrupted or incomplete.	• In the Genius™ program select the DATA COMMUNICATION SETTINGS/DATA FORMAT folder and check for HEADER, TERMINATOR, SEPARATOR and FILL CHAR values. • Check the CODE FIELD LENGTH value, too. • Are the COM port parameters correctly assigned?

TROUBLESHOOTING GUIDE	
Problem	**Suggestion**
How do I obtain my units' serial numbers?	• The device serial number is printed on the device identification label that is affixed to the reader (Figure A, 2). • The serial number is also displayed when connecting the device through the Genius™ program. • Serial numbers consist of 9 characters: one letter, 2 numbers, another letter followed by 5 numbers.

7 TECHNICAL FEATURES

ELECTRICAL FEATURES (see note 1)		
Supply voltage Power consumption	15 to 30 Vdc 15 W typical 20 W Max. (including startup current)	
Communication Interfaces	**Main (isolated)**	**Baud Rate**
	RS232	1200 to 115200
	RS485 full-duplex	1200 to 115200
	RS485 half-duplex	1200 to 115200
	20 mA Current Loop (INT-30 with C-BOX 100 only)	19200
	Auxiliary	
	RS232	1200 to 115200
	Other	
	Lonworks	1,25 Mb/s
	Ethernet	10 or 100 Mb/s
	DeviceNet	125 or 250 Kb/s
	Profibus	12 Mb/s
Inputs External Trigger 1, 3 auxiliary digital inputs	(optocoupled NPN or PNP)	
Outputs 3 software programmable digital outputs	(optocoupled)	
OPTICAL FEATURES (see note 1)		
Light receiver Wavelength Safety class Laser control	Avalanche photodiode 630 to 680 nm Class 2 - EN60825-1; Class II - CDRH Security system to turn laser off in case of motor slow down	
READING FEATURES		
Scan rate	600-1200 scans/s	
Maximum resolution Max. reading distance Max. reading width Max. depth of field	(see reading diagrams)	
USER INTERFACE		
LCD Display	2 lines by 16 characters LCD	
Keypad	3 keys	
LED indicators	Power ON (red color) Phase ON (yellow color) TX data (green color)	

Note 1: The features given are typical at 25 °C ambient temperature (if not otherwise indicated).

SOFTWARE FEATURES		
Readable codes	Interleaved 2/5	
	Code 39 standard	
	Codabar	
	Code 128 EAN128 Code 93 (Standard and Full ASCII) EAN/UPC (including Add-on 2 and Add-on 5)	
Code selection	Up to 10 codes during one reading phase	
Headers and Terminators	Transmitted messages can be personalized using up to 128-byte headers and 128-byte terminators	
Operating modes	On Line Automatic Test PackTrack™	
Configuration modes	Genius™ utility program	
Parameter storage	Non-volatile internal FLASH	
ENVIRONMENTAL FEATURES		
Operating temperature Storage temperature Humidity Ambient light immunity	0° to +40 °C (+32° to +104 °F) -20° to +70 °C (-4° to +158 °F) 90% non condensing 3500 lux	
Vibration resistance IEC 68-2-6 test FC 2 hours on each axis	14 mm @ 2 to 10 Hz 1.5 mm @ 13 to 55 Hz 2 g @70 to 200 Hz	
Shock resistance IEC 68-2-27 test EA 3 shocks on each axis	30 g; 11 ms;	
Protection class	IP64*	
PHYSICAL FEATURES	**Standard Models**	**Oscillating Mirror Models**
Mechanical dimensions	110 x 113 x 99 mm (4.33 x 4.45 x 3.9 in)	113 x 180 x 104.5 mm (4.45 x 7.08 x 4.11 in)
Weight	1.5 kg. (3.3 lb)	2.0 kg. (4.4 lb)

* IP50 grade for standard Ethernet versions.

GLOSSARY

ACR™ 4
Each version of the base has the powerful code reconstruction technology (ACR™ 4). The new third generation ACR™ considerably increases the code reconstruction reading capability in the case of damaged or very tilted barcodes.

Aperture
Term used on the required CDRH warning labels to describe the laser exit window.

ASTRA™
Automatically SwiTched Reading Area™ is the Datalogic technology based on a multi-laser architecture and a fixed mounted optic system which concentrates the multiple laser emissions in a single laser beam. As each laser emitter is focused on a specific range of the reading area, a sophisticated electronic controller selects the best focused laser emitter with respect to the code to read. This allows the reading of medium-high density codes in a large reading area on very fast conveyors.

Barcode
A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a barcode symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbology uses its own unique format.

Barcode Label
A label that carries a barcode and can be affixed to an article.

Baud Rate
A unit used to measure communications speed or data transfer rate.

CD SQUARE™
CD SQUARE™ provides useful information on label position and object shape elaborated during the barcode reading phase. This innovative technology identifies the area in which the code is located and measures the code distance from the scanner.

CDRH (Center for Devices and Radiological Health)
This organization (a service of the Food and Drug Administration) is responsible for the safety regulations governing acceptable limitations on electronic radiation from laser devices. Datalogic devices are in compliance with the CDRH regulations.

Code Positioning
Variation in code placement that affects the ability of a scanner to read a code. The terms Pitch, Skew, and Tilt deal with the angular variations of code positioning in the X, Y and Z axes. See pars. 2.5. Variations in code placement affect the pulse width and therefore the decoding of the code. Pulse width is defined as a change from the leading edge of a bar or space to the trailing edge of a bar or space over time. Pulse width is also referred to as a transition. Tilt, pitch, and skew impact the pulse width of the code.

EEPROM
Electrically Erasable Programmable Read-Only Memory. An on-board non-volatile memory chip.

Full Duplex
Simultaneous, two-way, independent transmission in both directions.

Half Duplex
Transmission in either direction, but not simultaneously.

Host
A computer that serves other terminals in a network, providing services such as network control, database access, special programs, supervisory programs, or programming languages.

Interface
A shared boundary defined by common physical interconnection characteristics, signal characteristics and meanings of interchanged signals.

LED (Light Emitting Diode)
A low power electronic device that can serve as a visible or near infrared light source when voltage is applied continuously or in pulses. It is commonly used as an indicator light and uses less power than an incandescent light bulb but more than a Liquid Crystal Display (LCD). LEDs have extremely long lifetimes when properly operated.

Multidrop Line
A single communications circuit that interconnects many stations, each of which contains terminal devices. See RS485.

PACKTRACK™
PackTrack™ is a Datalogic patented parcel tracking system which improves the reading features in omnidirectional stations. In particular, PackTrack™ manages 6-sided reading systems when it is impossible to detect the real position of the code on the parcel, thus overcoming the need for external accessories essential in traditional tracking systems.

Parameter
A value that you specify to a program. Typically parameters are set to configure a device to have particular operating characteristics.

Pitch
Rotation of a code pattern about the X-axis. The normal distance between center line or adjacent characters. See par. 2.5.

Position
The position of a scanner or light source in relation to the target of a receiving element.

Protocol
A formal set of conventions governing the formatting and relative timing of message exchange between two communicating systems.

Resolution
The narrowest element dimension which can be distinguished by a particular reading device or printed with a particular device or method.

RS232
Interface between data terminal equipment and data communication equipment employing serial binary data interchange.

RS485
Interface that specifies the electrical characteristics of generators and receivers for use in balanced digital multipoint systems such as on a Multidrop line.

Scanner
A device that examines a printed pattern (barcode) and either passes the uninterpreted data to a decoder or decodes the data and passes it onto the Host system.

Serial Port
An I/O port used to connect a scanner to your computer, identifiable by a 9-pin or 25-pin connector.

Signal
An impulse or fluctuating electrical quantity (i.e.: a voltage or current) the variations of which represent changes in information.

Skew
Rotation about the Y-axis. Rotational deviation from correct horizontal and vertical orientation; may apply to single character, line or entire encoded item. See par. 2.5.

Step-a-Head™
Step-a-Head™ makes it possible to rotate the reader head and the decoder base independently from each other. As a result of the Step-a-Head™, the DS6500 can always be installed in the ideal position. It is possible to change the orientation of the connector panel while the laser window remains in the desired position.

Symbol
A combination of characters including start/stop and checksum characters, as required, that form a complete scannable barcode.

Tilt
Rotation around the Z axis. Used to describe the position of the barcode with respect to the laser scan line. See par. 2.5.

Trigger Signal
A signal, typically provided by a photoelectric sensor or proximity switch, which informs the scanner of the presence of an object within its reading zone.

UPC
Acronym for Universal Product Code. The standard barcode type for retail food packaging in the United States.

Visible Laser Diode
A light source used in scanners to illuminate the barcode symbol. Generates visible red light at wavelengths between 630 and 680 nm.

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DS6500-XXX-XXX, Laser Scanner

e tutti i suoi modelli
and all its models
et tous ses modèles
und seine modelle
y todos sus modelos

sono conformi alle Direttive del Consiglio Europeo sottoelencate:
are in conformity with the requirements of the European Council Directives listed below:
sont conformes aux spécifications des Directives de l'Union Européenne ci-dessous:
der nachstehend angeführten Direktiven des Europäischen Rats:
cumple con los requisitos de las Directivas del Consejo Europeo, según la lista siguiente:

89/336/EEC EMC Directive e and et und y **92/31/EEC, 93/68/EEC** emendamenti successivi / further amendments / ses successifs amendements / späteren Abänderungen / succesivas enmiendas

73/23/EEC Low Voltage Directive

Basate sulle legislazioni degli Stati membri in relazione alla compatibilità elettromagnetica ed alla sicurezza dei prodotti.
On the approximation of the laws of Member States relating to electromagnetic compatibility and product safety.
Basée sur la législation des Etats membres relative à la compatibilité électromagnétique et à la sécurité des produits.
Über die Annäherung der Gesetze der Mitgliedsstaaten in bezug auf elektromagnetische Verträglichkeit und Produktsicherheit entsprechen.
Basado en la aproximación de las leyes de los Países Miembros respecto a la compatibilidad electromagnética y las Medidas de seguridad relativas al producto.

Questa dichiarazione è basata sulla conformità dei prodotti alle norme seguenti:
This declaration is based upon compliance of the products to the following standards:
Cette déclaration repose sur la conformité des produits aux normes suivantes:
Diese Erklärung basiert darauf, daß das Produkt den folgenden Normen entspricht:
Esta declaración se basa en el cumplimiento de los productos con la siguientes normas:

EN 55022 (CLASS A ITE), AUGUST 1994:
AMENDMENT A1 (CLASS A ITE), OCTOBER 2000:
LIMITS AND METHODS OF MEASUREMENTS OF RADIO DISTURBANCE CHARACTERISTICS OF INFORMATION TECHNOLOGY EQUIPMENT (ITE)

EN 61000-6-2, OCTOBER 2001:
ELECTROMAGNETIC COMPATIBILITY (EMC).
PART 6-2: GENERIC STANDARDS - IMMUNITY FOR INDUSTRIAL ENVIRONMENTS

EN 60950-1, DECEMBER 2001:
INFORMATION TECHNOLOGY EQUIPMENT – SAFETY –
PART 1: GENERAL REQUIREMENTS

EN 60825-1, JUNE 1994:
AMENDMENTS A11 (1996), A2 (2001):
SAFETY OF LASER PRODUCTS –
PART 1: EQUIPMENT CLASSIFICATION, REQUIREMENTS AND USER'S GUIDE

Lippo di Calderara, September 8th, 2005

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